DESIGN RESOURCE MANUAL

REDI ROCK®

The information contained in the Design Resource Manual (DRM) has been compiled by Redi-Rock International, LLC to document the performance of the Redi-Rock products contained therein. It is accurate to the best of our knowledge as of the date of its issue. Information included in the DRM has been prepared in accordance with generally recognized engineering principles and practices. This information should not be used without first securing competent advice with respect to its suitability for any general or specific application. Final determination of the suitability of any design information and the appropriateness of this data for a given design purpose is the sole responsibility of the user.

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We are committed to always providing you with up-to-date information and cutting-edge engineering. By registering your manual, you will ensure your access to the newest technical updates as they become available.

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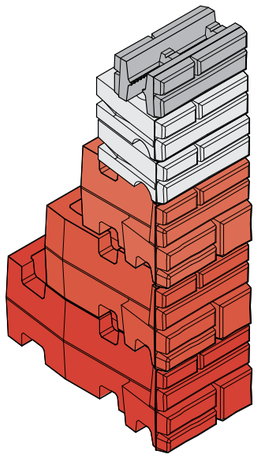
Meet the Family

With close to 80 blocks in the system, the Redi-Rock family of blocks is extensive. And, unlike some families, they all work together!

When optimizing your wall design, you can mix and match exactly the blocks you need from the Redi-Rock system. Try combinations of Gravity blocks, Positive Connection blocks for MSE walls, or the latest additions to the family of hollow-core products—Redi-Rock XL Hollow-Core Retaining blocks and Magic blocks.

With the integrated Redi-Rock system, finding solutions for tall walls isn't such a tall task.



Existing
REDI-ROCK®
System

REDI-ROCK®
XL

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GENERAL INFORMATION

Hello!

When Redi-Rock launched in 2000, the introduction of large, wetcast blocks changed the retaining wall industry. Nineteen years later as we publish our latest version of the Design Resource Manual, we're aiming to change more than an industry—we're aiming to reinforce the ways that we, together, are changing the world in concrete ways.

We know that the work you do makes an impact in your community, and we're honored each time you choose Redi-Rock to solve problems and improve people's lives. In recognition of that, we'll continue to strive to be a leader in the industry, providing the design tools and engineering resources you need to do that valuable work.

Within this manual, you'll see the latest innovation of the Redi-Rock system in Redi-Rock XL Hollow-Core Retaining blocks. Standing 36 inches (914 millimeters) tall and available in 52, 72, and 96-inch (1,320, 1,830, and 2,440-millimeter) widths, Redi-Rock XL blocks integrate with the rest of the proven system—including Magic, Positive Connection, Freestanding, and our standard Gravity blocks—helping you optimize taller walls in tighter spaces.

Also within these pages, you'll find answers to frequently asked questions, case studies, a detailed library of products, preliminary height guides, detailed design information, specifications, installation instructions, typical details, and much more. The information in this publication is intended to supplement even more information available anytime on our website at **redi-rock.com**.

If you're not finding what you're looking for or if there is anything we can do for you, please let us know how we can help.

Sincerely,

Jamie Johnson, PE
Director of Engineering and Operations

Redi-Rock International
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(866) 222-8400 ext. 3010

Frequently Asked Questions

WHAT IS REDI-ROCK?

Redi-Rock is a line of precast products made from durable, first-purpose, air-entrained, wet-cast concrete. The most common Redi-Rock products are large retaining wall blocks.

Often referred to as one-ton Lego blocks, Redi-Rock blocks vary in width from 28 inches (710 millimeters) to 96 inches (2.44 meters) and in weight from 1,200 pounds (544 kilograms) to 3,500 pounds (1,588 kilograms). In many instances, the Redi-Rock retaining wall blocks are big enough that they can be simply stacked on top of each other to construct a "gravity" wall. For even taller and/or more heavily loaded retaining walls, the Redi-Rock Positive Connection (PC) System can be used to construct a Mechanically Stabilized Earth (MSE) wall.

However, Redi-Rock is much more than simply large retaining wall blocks. Redi-Rock freestanding blocks have the same great look as the retaining blocks, with texture on two or more sides. These freestanding blocks are perfect for perimeter walls, entrance monuments, or parapet walls. Redi-Rock accessory products include column blocks, steps, and caps. These accessories are perfect for completing your project. We even have products like Pole Base® concrete foundations for light poles, driveway monuments, and signs.

WHO MAKES REDI-ROCK PRODUCTS?

Redi-Rock products are produced by over 130 independently-owned manufacturers located all over the globe. Contact information for the Redi-Rock manufacturer in your area is available anytime at **redi-rock.com**.

WHO DESIGNS REDI-ROCK RETAINING WALLS?

The answer to this question depends on what you are trying to accomplish. If you want to get a good idea of how Redi-Rock products can work for your project, the preliminary height guides in this *Design Resource Manual* are a great place to start. These guides show Redi-Rock wall sections in different assumed soil and loading conditions, and they can quickly help you determine what sections will likely work for your particular project.

When you want to build a wall, there simply is no substitute for detailed plans prepared by a licensed engineer who routinely designs retaining walls. Licensed professionals have proven themselves with years of study and practice, and they are uniquely qualified to create an optimal design for the specific conditions of your project. In addition, a seal of the calculations and design drawings by a "Design Professional of Responsible Charge" is generally required by the International Building Code (Section 105.2) for all walls over four feet (1,219 millimeters) in height.

WHO INSTALLS REDI-ROCK RETAINING WALLS?

Redi-Rock walls are typically constructed by earth excavating contractors or landscaping contractors using large pieces of earth-moving equipment. General contractors that have experience building Redi-Rock walls can be excellent resources for your project. Your local Redi-Rock manufacturer will often have close working relationships with the wall installers in your area and can be a great source of information.

Wondering how to install Redi-Rock? We can help there, too. Redi-Rock has a detailed *Installation Manual* that covers the basic installation steps. We also have several typical construction details showing how to build common things like 90-degree corners, curves, barriers, or other features in your wall. These resources are available in this *Design Resource Manual* and online at **redi-rock.com**.

HOW MUCH DO REDI-ROCK WALLS COST?

Since every project is different, there is no single price for a Redi-Rock wall. Several things must be accounted for, including material, labor, and shipping costs. Materials include Redi-Rock blocks, drainage aggregates, geotextiles, drain pipes, and possibly even select fill; however, project costs are much more than just the sum of material costs. Although Redi-Rock blocks may have a higher price per unit than smaller, dry-cast retaining wall products or blocks made from inferior materials like return concrete, they provide significant savings due to installation speed and product longevity.

The true cost of a Redi-Rock wall must be evaluated on the cost per area of wall face (dollars per square foot or square meter) of the completed structure over the full life of the structure. For taller mechanically stabilized earth walls, part of the cost per square unit area of the retaining wall includes the factory cut geogrid strips that are used with the PC blocks. These strips are specifically manufactured and certified for width and strength, providing construction efficiencies and design reliability that add value to your project.

The real value in Redi-Rock retaining walls comes from superior engineering, high-quality products, and unbeatable face textures that lead to extremely robust and attractive structures that will last for a lifetime. It is because of the intricacies and complexities of each unique project that the very best source for pricing is typically from the Redi-Rock manufacturer located closest to your project site. Find the closest manufacturer at **redi-rock.com**.

WILL REDI-ROCK WORK FOR MY PROJECT?

Redi-Rock has been used with outstanding success on a myriad of different retaining wall applications. Some examples are retaining walls in water applications (seawalls, bank stabilization, channelization, and detention ponds), bridge abutments, parks, residential projects, commercial projects, highway walls, GRS-IBS structures, and even rail applications. Chances are, someone has already figured out a way to use Redi-Rock on a project just like yours. There are hundreds of case studies available at **redi-rock.com** that will help you visualize how Redi-Rock can be used to make your project a reality.

I HAVE MORE QUESTIONS... WHAT SHOULD I DO?

Quite simply, ask. Your local Redi-Rock manufacturer is a great place to start. Often they have working relationships with wall design engineers and local installers. You can also contact Redi-Rock International, either through your local manufacturer or directly by calling **(866) 222-8400** or by email at **engineering@redi-rock.com**. We have engineers on staff who can help answer general design questions, provide specific information about our products, and point you in the right direction to successfully design and install your own outstanding Redi-Rock retaining wall.

CASE STUDIES

Changing the World in Concrete Ways

On the pages to follow, you'll find a few case studies outlining how the Redi-Rock system is used to solve various retaining wall challenges. We hope they, along with the myriad of others found online at redi-rock.com, provide the confidence and context you need to design and install Redi-Rock.

We also hope they provide a spark of inspiration about how the work you do can change the lives around you. If you have a story to share about how a Redi-Rock project you were involved with is changing the world in concrete ways—like providing a recreational connection for two mountain towns or protecting residents of a seaside community from 100-year storms—we want to hear it.

Nominate projects that are improving lives at **redi-rock.com/nominate.**

WATER APPLICATION:

Ocean Marina Wall Weathers Massive Storms

THE CHALLENGE

In the spring of 2012, a massive construction project to transform Rhyl's riverfront area broke ground. Rhyl, located in North Wales on the Irish Sea at the mouth of the River Clwyd, is part of the Wales Coast Path which follows the entire coastline of Wales.

The goal of the project was to increase tourism and boost the local economy, as well as deepen the river channel, enlarge the marina, and provide coastal erosion and flood protection. To accomplish this, the site required a retaining wall solution that could meet the complex structural requirements of the site—including significant tidal fluctuations—while providing a scenic park route for pedestrians and cyclists.

THE SOLUTION

Designers for the project chose Redi-Rock Positive Connection (PC) blocks to create the harbor wall that stands 24.3 feet (7.4 meters) high and stretches 617 feet (188 lineal meters). Produced locally by Redi-Rock manufacturer CPM Group, the Redi-Rock PC walls were able to meet the structural requirements of the site as well as provide an aesthetic Limestone finish at a lower cost than other options.

"The Redi-Rock product is very simple but massively effective," said Jamie Turner, site agent for general contractor Dawnus Construction. "It is easy to install and the end product looks fantastic, I would definitely use this product again."

THE OUTCOME

During the 2013-2014 winter season, the new harbor sea wall was put to the test. For days, a storm battered the United Kingdom and caused a 60-year high tidal surge. January wave heights were close to the 100-year level.

While this massive storm caused damage to many other structures in the area, designers were happy to see that the harbor wall performed exactly as engineered. The city was so impressed with how the Redi-Rock wall performed during the storm, they replaced 3,280 feet (1 kilometer) of other nearby walls with Redi-Rock.

Project: Foryd Harbour Enhancement Project #160 ***Project Management:*** Denbighshire County Council Wall ***Design:*** CPM Group and Groundsolve Ltd Geotechnical Consultants ***General Contractor:*** Dawnus Construction ***Manufacturer:*** CPM Group ***Location:*** Rhyl, North Wales, United Kingdom ***Completed:*** 2012-2013

Project: Parklands at Floyds Fork #153 ***Owner:*** 21st Century Parks ***Architects:*** Wallace, Roberts & Todd, and Bravura Architects ***Engineers:*** HNTB and QK4 Wall ***Design:*** Civil Design Professionals and JC Hines & Associates ***Installer:*** MAC Construction and Redi-Rock of K.I.T. ***Manufacturer:*** Redi-Rock of K.I.T. Location: Louisville, Kentucky ***Completed:*** 2010-2012

ROAD APPLICATION:

Tall Reinforced Walls Make Road Construction Possible for Park

THE CHALLENGE

Creating a 21-mile (33.8-kilometer) long park system that encompasses more than 3,800 acres (1,538 hectares) is no small task, but it's what 21st Century Parks set out to do by linking four major parks with a park drive and trail network.

Due to the diverse topography of the Louisville, Kentucky, area, 21st Century Parks needed a flexible retaining wall solution that would meet the needs across multiple phases of construction.

THE SOLUTION

For their solution, they turned to Redi-Rock of K.I.T.

"[Redi-Rock] was chosen for a couple reasons," said Joe Daley, architect and project manager for 21st Century Parks. "One, was the aesthetics—this is a park project, not a highway project. It had to fit in with the stone and other materials being used in the park...Also, the cost and the time frame were big considerations."

The first phase of the project had both gravity and reinforced Positive Connection (PC) walls, and the next phase of the project included creating an overpass for Interstate 64 where a 1,200-square-foot (111-square-meter) gravity headwall was used.

An additional phase of the Parklands project required three separate walls, totaling 21,000 square feet (1,950 square meters) of Redi-Rock to handle the significant grade changes. One of those walls was a 41-foot (12.5-meter) tall PC wall—the tallest Redi-Rock wall at the time of construction.

"The high efficiency of the PC system really made it possible to design tiered walls with those loads at that height," said design engineer Clint Hines, PE. "It would be hard to make it work with anything else."

THE OUTCOME

"I think everyone is really happy with the way it looks," Daley said.

The Redi-Rock retaining walls throughout the Parklands fulfilled the technical demands and the aesthetic desire for the project, which garnered accolades from entities like the National Park Service and the American Society of Landscape Architects.

construction

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UNIVERSITY APPLICATION:

Creating Space on Campus with Redi-Rock

THE CHALLENGE

Worcester State University (WSU) started as a teacher training school in 1874, transitioned to a liberal arts and sciences school in 1963, and became a state university in 2010. As the university grew, it acquired more students but struggled to find space for additional housing.

"WSU, along with the rest of Worcester, is nothing but hills," said Casey Scavone of Redi-Rock Walls of New England.

THE SOLUTION

WSU chose Redi-Rock Walls of New England to help expand the buildable area for a new residence hall, student union, and dining commons overlooking the sports fields.

The site included a moderate slope and global stability issues, so design engineer Eric Merluzzi, PE, had to incorporate geogrid reinforcement into the lower wall; but, he was able to optimize the design by using the gravity blocks for the top tier of the wall.

The project also incorporated many curving walls, which Merluzzi said were simple to achieve because of the tapered block shape.

"There's no cutting, no trimming -- the blocks fit nice and neat," he said. "It works well."

Aesthetics were also very important to the university. Thousands of students and visitors will view the wall each year, due to its close proximity to Coughlin Field, the main athletic field on campus.

"They wanted something that looked natural and something that would really stick out, so New England Ledgestone was a great fit," said Scavone.

THE OUTCOME

Despite New England winter weather conditions, installers from Ernest Guigli & Sons, Inc. were able to install the walls in a three month period. The majority of the 1,200 blocks for the project were retaining blocks, though the wall was topped with freestanding blocks and caps to provide a finished appearance.

"This was a great project for us," said Scavone. "With all the people that are going to pass this area over the years here at WSU, it's a fantastic project. The install was beautiful—everything came out perfect."

Project: Worcester State University #175 ***Owner:*** Worcester State University ***Engineer:*** Eric Merluzzi, P.E. ***Installer:*** Ernest Guigli & Sons, Inc.
Manufacturer: Redi-Rock Walls of New England ***Location:*** Worcester, MA ***Completed:*** 2013

RAIL APPLICATION:

Back-to-Back Reinforced Walls Elevate CN Rail Line

THE CHALLENGE

In 2011, the Canadian National (CN) Railway and the Montreal Metro began construction to eliminate an at-grade crossing where the CN Rail line crossed over the Société de Transport de Montréal (STM) light commuter Metro line.

These two lines ran through a narrow corridor with several sections of track overlapping. To completely separate the tracks, plans were made to elevate the CN Rail line on a bridge structure and excavate to relocate the Metro underground. To elevate the CN Rail line, designers needed to build a gradual, walled slope leading up to a massive concrete bridge structure and then down the other side.

THE SOLUTION

Back-to-back poured-in-place concrete walls were an option for creating the ramps, but when CN Rail geotechnical engineers saw the Redi-Rock Positive Connection (PC) blocks at the Transportation Research Board (TRB) meeting in early 2011, they began incorporating Redi-Rock PC walls from local manufacturer Graymont Materials into the design.

“The PC system is the only block with this type of connection which allowed it to handle the loads,” said David Chartier, junior engineer with V. Fournier & Associés. “When you have massive loads so near the block facing, it’s hard to make a wall that will work. The walls are very high and the load is very close, but the civil engineering of this block made it a good fit.”

To install the geogrid for a PC wall, a 12-inch (305 millimeter) wide strip of geogrid was wrapped through each retaining wall block, tying the Redi-Rock facing blocks to the reinforced soil mass with a weight independent positive connection.

THE OUTCOME

In total, the project required 7,800 Redi-Rock blocks in the Cobblestone texture—equaling 44,850 square feet (4167 square meters). Trains made their first run on the line in late 2013, and the project has been performing exactly as engineered.

“It’s looking beautiful, that’s for sure. The city is very happy,” said Charles Poulin, ing. of CRT Construction.

construction

MUNICIPAL APPLICATION:

Recreational Path Connects Two Colorado Mountain Towns

THE CHALLENGE

All great visions have to start somewhere. This one began with over three miles of paved multi-purpose trail winding through scenic Clear Creek Canyon.

This was no easy task, as the terrain includes steep slopes, flooding issues along the river, active landslide problems and limited space. In addition, protecting the natural habitat of endangered species was a must.

Project engineer Matt Andrews from Muller Engineering Co. said, "One of the main objectives of this project was to create a trail and retaining walls that would blend so seamlessly with the canyon that users would think it had always been there."

THE SOLUTION

The engineers carved out the best route in the narrow canyon to create a 10-foot (3-meter) wide trail, using many miles of Redi-Rock retaining walls above and below the trail line.

"The Redi-Rock gravity system was the perfect solution for the constricted space because it doesn't require reinforcements," said Seth Clark from Signature Stone, the local Redi-Rock manufacturer. "In addition, Redi-Rock products allowed the walls to blend beautifully into the landscape because each block is cast in a mold taken from real natural stone—the Ledgestone texture perfectly matched the natural rock in the area."

THE OUTCOME

"Due to the size of the blocks, along with the Ledgestone texture, we were able to design the wall to follow the grade rather than have steps in the wall," added Clark. "This concept worked very well, and the subtle changes in the wall profile adds another level of beauty to the project."

On July 29, 2016, the Clear Creek segment of the trail was ceremoniously opened for people to enjoy this picturesque canyon. From families out for a casual hike or bike ride, to experienced outdoor adventurists, this trail offers something for everyone.

Project: Peaks to Plains #189 ***Engineer:*** Muller Engineering Co. ***Designer:*** Ground Engineering ***Installer:*** Concrete Express, Inc. ***Manufacturer:*** Signature Stone ***Location:*** Jefferson County and Clear Creek County, Colorado ***Completed:*** 2016-Ongoing

RESIDENTIAL APPLICATION:

Major Landscape Upgrade for Washington Home

THE CHALLENGE

Mark Hattenburg wanted to add a terrace and pool to the backyard of his home near Spokane, Washington. He knew he would need to do something about the 8-foot (2.4-meter) grade change on the property, and he really wanted something that would look good.

But, he had no design plan and wasn't quite sure where to begin.

THE SOLUTION

While driving down Little Spokane Drive one day, Rick Lindberg from local Redi-Rock manufacturer Wilbert Precast noticed an excavator in the field behind Hattenburg's house. Curious about the project and knowing it would require a retaining wall, he spoke to Hattenburg about his plans.

"He knew he needed a wall, but he just didn't know what he was going to do," said Lindberg. Lindberg's background is in landscape design, so he offered to help Hattenburg by designing the backyard landscape using Redi-Rock.

Hattenburg owns a construction company called Hattenburg Excavation. Having installed Redi-Rock walls in the past, he knew Redi-Rock would be a good fit on this project, too.

The Hattenburgs were happy with the design which included Redi-Rock gravity retaining and freestanding walls, plus coordinating columns, steps, and caps, all in the Cobblestone texture. A waterfall feature was incorporated into the design to conceal the utilities for the pool.

Because of his professional experience with Redi-Rock, Hattenburg installed the walls himself explaining, "It was pretty straight forward; we didn't really have a whole lot of challenges once we got the plans set."

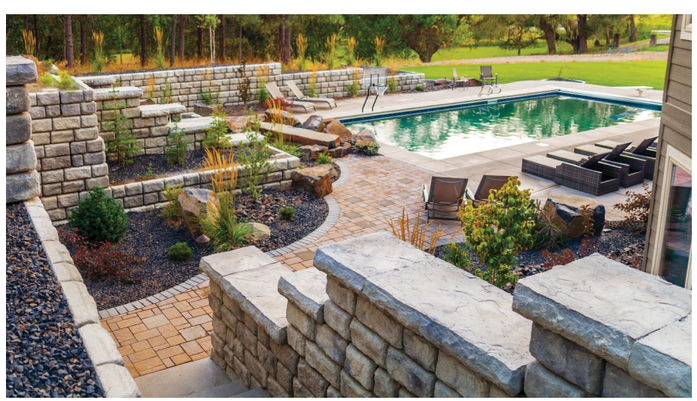
THE OUTCOME

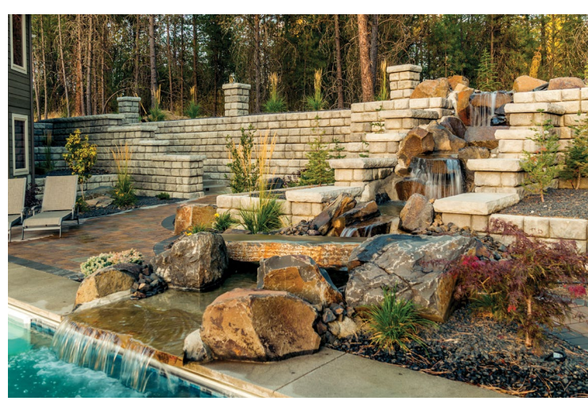
Over 500 Redi-Rock blocks were used to complete the beautiful yard and pool area with walls that went up to 10 feet (3 meters) high at the tallest point.

Hattenburg and his family are very pleased with how their backyard turned out.

"They all like it...we're always in the backyard in the pool," Hattenburg said. In fact, they are now using Redi-Rock for more property updates.

"We're working on designing his entry now," said Lindberg.





Project: John C. Tune Airport #207 **Owner:** Metropolitan Nashville Airport Authority **Site Contractor:** Civil Constructors, LLC **Wall Design:** JC Hines & Associates **Manufacturer & Installer:** Redi-Rock of K.I.T. **Location:** Nashville, Tennessee **Completed:** 2018

REDI-ROCK XL APPLICATION

XL Hollow-Core Retaining Blocks Optimize Gravity Wall at Airport

THE CHALLENGE

When the excavation for a cut wall at John C. Tune Airport in Nashville, Tennessee, unearthed a geotechnical can of worms, it was time to go back to the drawing board to design a taller wall.

Civil Constructors unearthed that an unstable fill material had been used on the development of the adjacent property, which created an issue with the crest slope of the wall. There were also buried boulders instead of solid rock in some locations, and the limestone rock cut wasn't as tall as originally anticipated.

THE SOLUTION

After exploring several alternatives, wall design engineer Clint Hines, P.E., was able to keep the wall a Redi-Rock gravity wall by using the newest innovation in the Redi-Rock system—Redi-Rock XL Hollow-core Retaining blocks.

"The only way we could get up and down at the heights that were now required was really going to be with the XL units," said Hines. Three new block sizes round out the Redi-Rock system to help build taller walls in tight spaces while using less concrete.

For this wall in particular, Hines was able to reach a maximum height of 25.5 feet (7.8 meters), using 806 XL blocks of various widths, then transitioning to standard Redi-Rock blocks at the top of the wall to optimize the design.

He worked closely with the project geotechnical engineer to gather new, accurate data, and then used the Redi-Rock Wall Professional software program to design, analyze, and optimize the wall.

THE OUTCOME

While the hangar isn't slated to finish until 2019, Redi-Rock of K.I.T. manufactured and installed the wall, and Hines attributed the success of the redesign process to two things.

"Having that whole system of products available and then having the Redi-Rock software that you could model such an intricate geotechnical model to make sure that you had everything covered, it was really the marriage of the two—the software and the product," he said.

BLOCK LIBRARY

One System, Four Textures, Endless Solutions

The Redi-Rock system is robust, and each of the components can be seamlessly integrated into a cohesive retaining wall design. With the ability to get any block in the Redi-Rock arsenal in four, natural stone textures, it means that technical agility comes with just the right aesthetic touch.

Each local manufacturer produces Redi-Rock in colors that match their natural terrain using molds crafted from real stone and first-use, architectural-grade, precast concrete. That means Redi-Rock walls have detail, durability, and design power—a combination that's hard to come by.

Check out the faces of Redi-Rock's endless solutions: LEDGESTONE, COBBLESTONE, LIMESTONE, AND KINGSTONE.

LEDGESTONE

The rugged relief of Ledgestone blocks give projects a random, stacked stone appearance. With up to 115 square feet (10.5 square meters) of non-repeating texture, it'll be tough to tell all that large block power is behind that pretty face. It's a win-win.

Ledgestone

COBBLESTONE

When it comes to classic good looks, Cobblestone is where it's at. Each one-ton block features the appearance of six smaller blocks, creating a timeless aesthetic. Sometimes, the linear appeal of a smaller stacked stone provides the enduring impact you're looking for in a wall.

Cobblestone

LIMESTONE

The six square feet (0.5 square meters) of face per Limestone block leaves a large, lasting impression. Crafted from real split limestone, the quarried stone texture means there's no need to sacrifice on style for function—you can get both at a grand scale!

Limestone

KINGSTONE

Striking a balance between the grandiose scale of Limestone and rugged relief of Ledgestone, Kingstone appears weathered by water and time like the crown of a natural stone outcropping. With each Redi-Rock block looking like a large, quarried stone, Kingstone will transform retaining walls into castle-worthy walls.

Kingstone

RETAINING BLOCKS
(FINISHED TEXTURE ON ONE FACE)

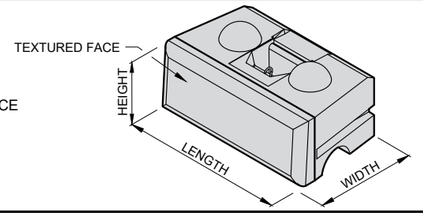
The Redi-Rock Retaining wall blocks come in multiple widths and configurations. The defining characteristic is that Retaining blocks have an aesthetic texture cast into only ONE face, and the textured face is the only side exposed to view in the finished wall. These blocks are machine-placed, wet-cast, precast modular block units manufactured from first purpose, non-reconstituted concrete and intended for constructing dry-stacked modular retaining wall systems. The block units are manufactured from structural-grade concrete mixes in accordance with ASTM C94 or ASTM C685 that produce a finished unit with excellent resistance to freeze-thaw, deicing chemical exposure, and submerged conditions in both fresh water and salt water applications. All Redi-Rock blocks are manufactured and distributed through an international network of individually-owned, licensed precast concrete manufacturers.

CONCRETE MIX PROPERTIES (1)

FREEZE THAW EXPOSURE CLASS (2)	MINIMUM 28 DAY COMPRESSIVE STRENGTH (3)	MAXIMUM WATER CEMENT RATIO	NOMINAL MAXIMUM AGGREGATE SIZE (10)	AGGREGATE CLASS DESIGNATION (4)	AIR CONTENT (5)
MODERATE	4,000 psi (27.6 MPa)	0.45	1.0 (25)	3M	4.5% ± 1.5%
SEVERE	4,000 psi (27.6 MPa)	0.45	1.0 (25)	3S	6.0% ± 1.5%
VERY SEVERE	4,500 psi (30.0 MPa)	0.40	1.0 (25)	4S	6.0% ± 1.5%
MAXIMUM WATER-SOLUBLE CHLORIDE ION (Cl^-) CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT (6,7)					0.15
MAXIMUM CHLORIDE AS Cl^- CONCENTRATION IN MIXING WATER, PARTS PER MILLION					1000
MAXIMUM PERCENTAGE OF TOTAL CEMENTITIOUS MATERIALS BY WEIGHT (8,10) (VERY SEVERE EXPOSURE CLASS ONLY)					
FLY ASH OR OTHER POZZOLANS PER ASTM C618		25	TOTAL ASH, POZZOLANS, SLAG, AND SILICA FUME (9)		50
SLAG CONFORMING TO ASTM C989		50	TOTAL ASH, POZZOLANS, AND SILICA FUME (9)		35
SILICA FUME CONFORMING TO ASTM C1240		10	ALKALI-AGGREGATE REACTIVITY MITIGATION PER ACI 201		

REFERENCE DIMENSIONS:

HEIGHT = VERTICAL DIMENSION OF TEXTURED FACE
LENGTH = HORIZONTAL DIMENSION PARALLEL TO TEXTURED FACE
WIDTH = HORIZONTAL DIMENSION PERPENDICULAR TO TEXTURED FACE



DIMENSIONAL TOLERANCES (11) (12)

HEIGHT	ALL BLOCKS	18 ± 3/16 (457 ± 5) or 36 ± 3/16 (914 ± 5)
LENGTH	FULL BLOCKS	46⅛ ± ½ (1172 ± 13)
	HALF BLOCKS	22 13/16 ± ½ (579 ± 13)
WIDTH	28" (710) BLOCKS	22⅝ ± ½ (575 ± 13) FORM LINE TO BACK OF BLOCK, PLUS APPROXIMATELY 5⅜ (136) FACE TEXTURE
	41" (1030) BLOCKS	35⅛ ± ½ (892 ± 13) FORM LINE TO BACK OF BLOCK, PLUS APPROXIMATELY 5⅜ (136) FACE TEXTURE
	60" (1520) BLOCKS	54⅝ ± ½ (1387 ± 13) FORM LINE TO BACK OF BLOCK, PLUS APPROXIMATELY 5⅜ (136) FACE TEXTURE
	52" (1320) XL BLOCKS	46⅝ ± ½ (1184 ± 13) FORM LINE TO BACK OF BLOCK, PLUS APPROXIMATELY 5⅜ (136) FACE TEXTURE
	72" (1830) XL BLOCKS	66⅝ ± ½ (1692 ± 13) FORM LINE TO BACK OF BLOCK, PLUS APPROXIMATELY 5⅜ (136) FACE TEXTURE
	96" (2440) XL BLOCKS	90⅝ ± ½ (2302 ± 13) FORM LINE TO BACK OF BLOCK, PLUS APPROXIMATELY 5⅜ (136) FACE TEXTURE

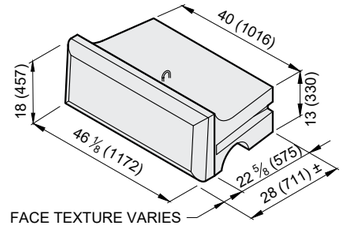
(1) Concrete mix properties are in general accordance with ACI 318 durability requirements. Research has shown that concrete manufactured to these standards demonstrates good durability and performance. When these requirements are followed, specific freeze-thaw testing of the concrete is typically NOT required.
(2) Exposure class is as described in ACI 318.
(3) Test method ASTM C39.
(4) Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete.*
(5) Test method ASTM C231.
(6) Test method ASTM C1218 at age between 28 and 42 days.
(7) Where used in high sulfate environments or where alkali-silica reactivity is and issue, watesoluble chloride shall be limited to no more than trace amounts (from impurities in concrete-making components, not intended constituents.)
(8) The total cementitious material also includes ASTM C150, C595, C845, and C1157 cement. The maximum percentages shall include:
(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.
(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.
(c) Silica fume, ASTM C1240, present in a blended cement.
(9) Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.
(10) Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze-thaw durability in a detailed and current testing program.
(11) All dimensions are shown in units of *inches (mm)*.
(12) Permissible defects: Chips smaller than 1.5" (38mm) in its largest dimension and cracks not wider than 0.012" (0.305mm) and not longer than 25% of the nominal height of the block; bug holes in the architectural face smaller than 0.75" (19mm); and bug holes, water marks, and color variation on non-architectural faces.

RETAINING BLOCKS

Block Library

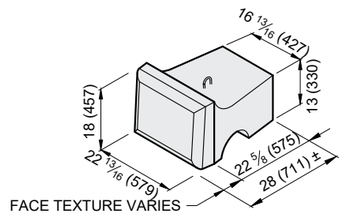
R-28T 28" (710mm) TOP

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1230 lb (557 kg)	1160 lb (530 kg)
Block Volume:	8.57 ft³ (0.243 m³)	8.07 ft³ (0.229 m³)
Center of Gravity:	14.9" (378mm)	14.2" (362mm)



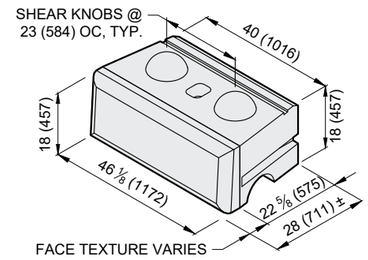
R-28HT 28" (710mm) HALF TOP

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	570 lb (260 kg)	540 lb (240 kg)
Block Volume:	4.01 ft³ (0.113 m³)	3.76 ft³ (0.106 m³)
Center of Gravity:	15.3" (389 mm)	14.7" (373 mm)



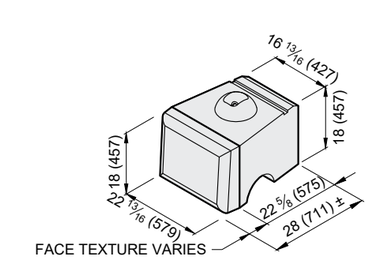
R-28M 28" (710mm) MIDDLE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1610 lb (730 kg)	1540 lb (700 kg)
Block Volume:	11.28 ft³ (0.319 m³)	10.78 ft³ (0.305 m³)
Center of Gravity:	13.9" (354 mm)	13.4" (340 mm)



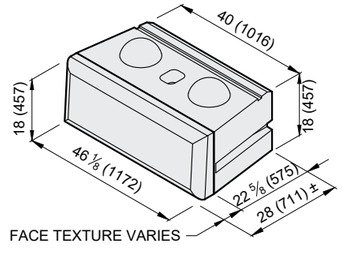
R-28HM 28" (710mm) HALF MIDDLE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	750 lb (340 kg)	710 lb (320 kg)
Block Volume:	5.23 ft³ (0.148 m³)	4.98 ft³ (0.141 m³)
Center of Gravity:	14.3" (364 mm)	13.8" (350 mm)



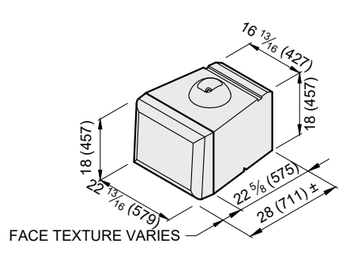
R-28B 28" (710mm) BOTTOM

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1740 lb (790 kg)	1670 lb (760 kg)
Block Volume:	12.19 ft³ (0.345 m³)	11.70 ft³ (0.331 m³)
Center of Gravity:	14.0" (355 mm)	13.5" (343 mm)



R-28HB 28" (710mm) HALF BOTTOM

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	810 lb (370 kg)	770 lb (350 kg)
Block Volume:	5.66 ft³ (0.160 m³)	5.41 ft³ (0.153 m³)
Center of Gravity:	14.3" (364 mm)	13.8" (352 mm)



1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Center of Gravity is measured from the back of block.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft³ (2291kg/m³).
6. Half blocks contain a fork slot on only one side of the block.
7. Interface Shear knobs are typically 10" (254mm) diameter by 4" (102mm) tall. Smaller knob diameters are available.

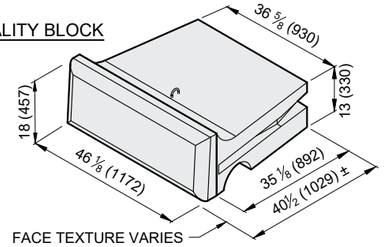
RETAINING BLOCKS

Block Library

R-41T 41" (1030mm) TOP *

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1750 lb (790 kg)	1680 lb (760 kg)
Block Volume:	12.22 ft³ (0.346 m³)	11.73 ft³ (0.332 m³)
Center of Gravity:	21.3" (540 mm)	20.6" (522 mm)

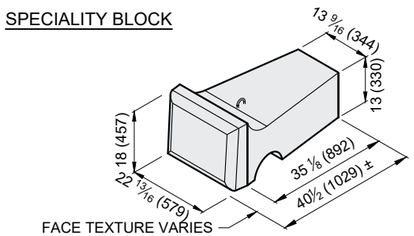
SPECIALITY BLOCK



R-41HT 41" (1030mm) HALF TOP *

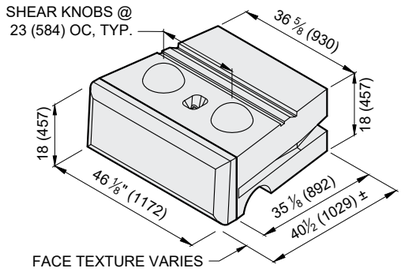
Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	770 lb (350 kg)	740 lb (330 kg)
Block Volume:	5.38 ft³ (0.15 m³)	5.14 ft³ (0.15 m³)
Center of Gravity:	22.4" (568 mm)	21.6" (550 mm)

SPECIALITY BLOCK



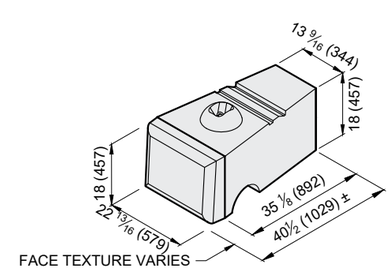
R-41M 41" (1030mm) MIDDLE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	2310 lb (1050 kg)	2240 lb (1020 kg)
Block Volume:	16.14 ft³ (0.457 m³)	15.65 ft³ (0.443 m³)
Center of Gravity:	20.4" (518 mm)	19.8" (504 mm)



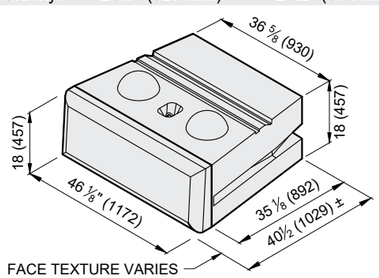
R-41HM 41" (1030mm) HALF MIDDLE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1020 lb (460 kg)	990 lb (450 kg)
Block Volume:	7.14 ft³ (0.20 m³)	6.90 ft³ (0.20 m³)
Center of Gravity:	21.4" (543 mm)	20.8" (528 mm)



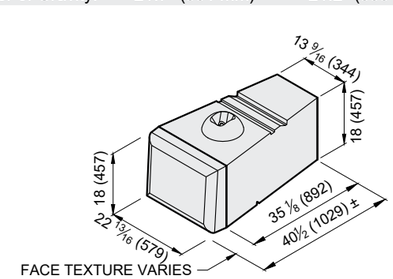
R-41B 41" (1030mm) BOTTOM

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	2440 lb (1110 kg)	2370 lb (1070 kg)
Block Volume:	17.06 ft³ (0.483 m³)	16.56 ft³ (0.469 m³)
Center of Gravity:	20.7" (527 mm)	20.2" (514 mm)



R-41HB 41" (1030mm) HALF BOTTOM

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1080 lb (490 kg)	1050 lb (480 kg)
Block Volume:	7.58 ft³ (0.21 m³)	7.33 ft³ (0.21 m³)
Center of Gravity:	21.7" (551 mm)	21.2" (538 mm)



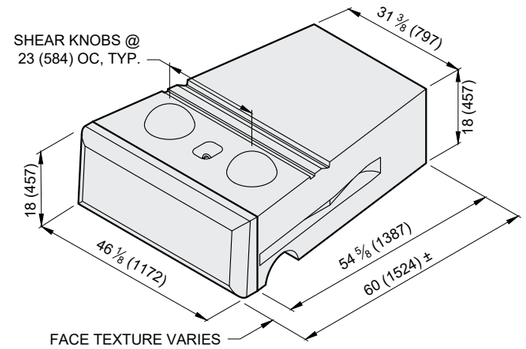
1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Center of Gravity is measured from the back of block.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft³ (2291kg/m³).
6. Half blocks contain a fork slot on only one side of the block.
7. Interface Shear knobs are typically 10" (254mm) diameter by 4" (102mm) tall. Smaller knob diameters are available.
8. * 41" (1030mm) Top blocks are not typical and used in limited applications.

RETAINING BLOCKS

Block Library

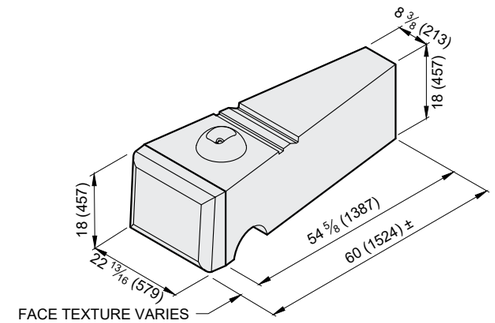
R-60M 60" (1520mm) MIDDLE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	3290 lb (1490 kg)	3220 lb (1460 kg)
Block Volume:	23.00 ft³ (0.651 m³)	22.49 ft³ (0.637 m³)
Center of Gravity:	31.0" (786 mm)	30.4" (772 mm)



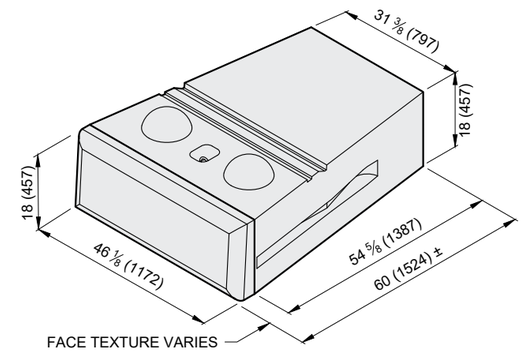
R-60HM 60" (1520mm) HALF MIDDLE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1340 lb (610 kg)	1300 lb (590 kg)
Block Volume:	9.34 ft³ (0.264 m³)	9.09 ft³ (0.258 m³)
Center of Gravity:	33.7" (856 mm)	33.1" (840 mm)



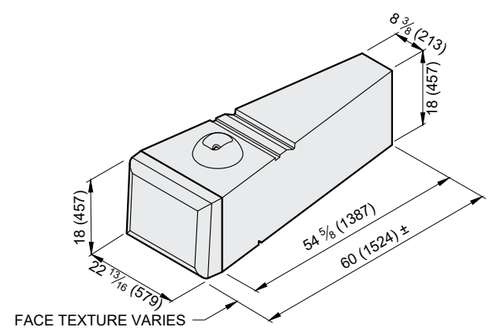
R-60B 60" (1520mm) BOTTOM

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	3420 lb (1550 kg)	3350 lb (1520 kg)
Block Volume:	23.90 ft³ (0.677 m³)	23.40 ft³ (0.663 m³)
Center of Gravity:	31.6" (802 mm)	31.0" (788 mm)



R-60HB 60" (1520mm) HALF BOTTOM

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1400 lb (630 kg)	1360 lb (620 kg)
Block Volume:	9.77 ft³ (0.277 m³)	9.52 ft³ (0.270 m³)
Center of Gravity:	34.3" (871 mm)	33.7" (856 mm)



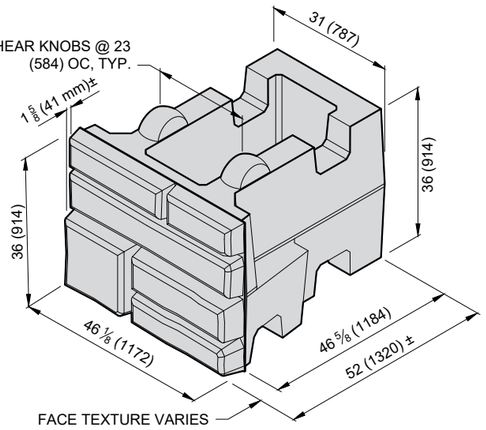
1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Center of Gravity is measured from the back of block.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft³ (2291kg/m³).
6. 60" (1520 mm) are typically used at the bottom of taller walls.
7. Half blocks contain a fork slot on only one side of the block.
8. Interface Shear knobs are typically 10" (254mm) diameter by 4" (102mm) tall. Smaller knob diameters are available.

RETAINING BLOCKS

Block Library

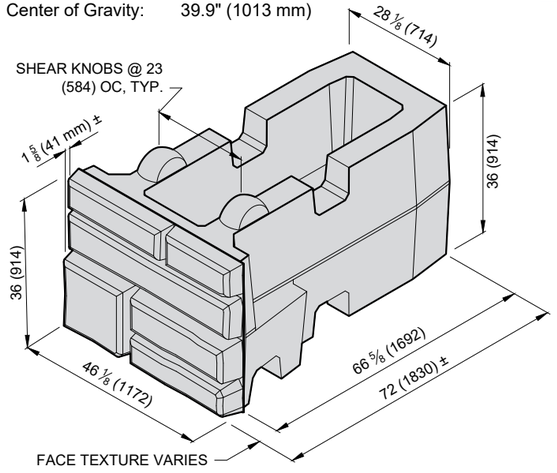
R-5236HC 52" (1320 mm) XL Hollow-Core

Face Texture:	Ledgestone
Block Weight:	3330 lb (1510 kg)
Block Volume:	23.29 ft^3 (0.660 m^3)
Infill Volume:	22.88 ft^3 (0.648 m^3)
Center of Gravity:	29.0" (737 mm)



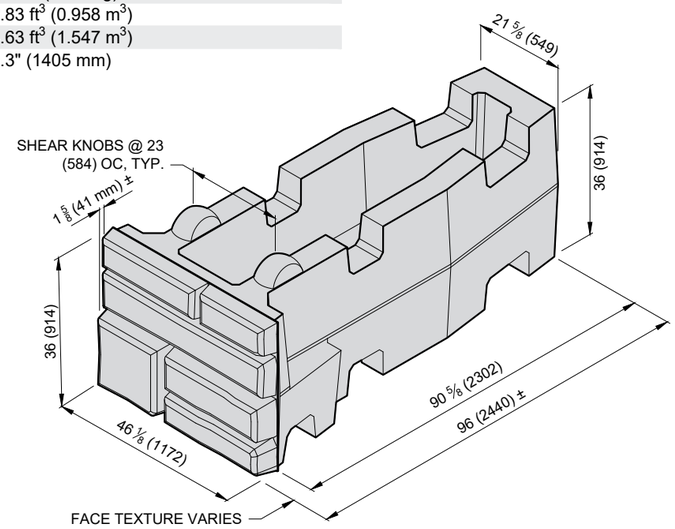
R-7236HC 72" (1830 mm) XL Hollow-Core

Face Texture:	Ledgestone
Block Weight:	4160 lb (1890 kg)
Block Volume:	29.10 ft^3 (0.824 m^3)
Infill Volume:	36.29 ft^3 (1.028 m^3)
Center of Gravity:	39.9" (1013 mm)



R-9636HC 96" (2440 mm) XL Hollow-Core

Face Texture:	Ledgestone
Block Weight:	4840 lb (2190 kg)
Block Volume:	33.83 ft^3 (0.958 m^3)
Infill Volume:	54.63 ft^3 (1.547 m^3)
Center of Gravity:	55.3" (1405 mm)



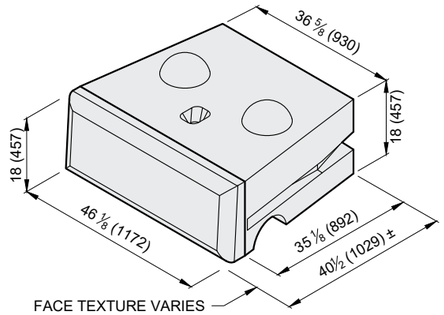
1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Center of Gravity is measured from the back of block, excluding stone infill.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft^3 (2291kg/m^3).
6. Interface Shear knobs are nominally 10" (254mm) diameter by 4" (102 mm) tall.

RETAINING BLOCKS

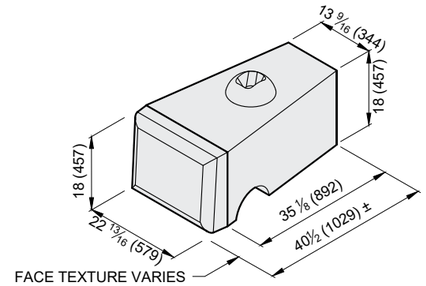
Block Library

R-419M 41" (1030mm) MIDDLE 9" (230mm) SETBACK R-419HM

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone	Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	2320 lb (1050 kg)	2250 lb (1020 kg)	Block Weight:	1030 lb (470 kg)	1000 lb (450 kg)
Block Volume:	16.21 ft^3 (0.46 m^3)	15.72 ft^3 (0.44 m^3)	Block Volume:	7.20 ft^3 (0.20 m^3)	6.96 ft^3 (0.20 m^3)
Center of Gravity:	20.2" (514 mm)	19.7" (500 mm)	Center of Gravity:	21.3" (540 mm)	20.7" (525 mm)



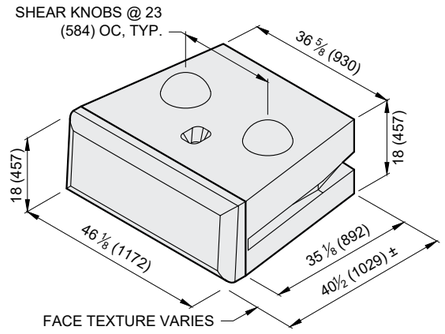
FULL MIDDLE



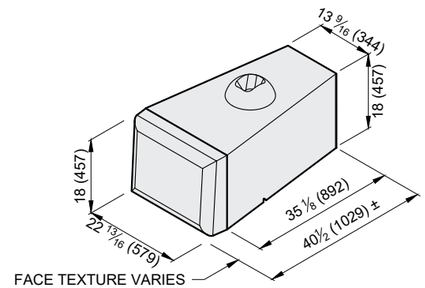
HALF MIDDLE

R-419B 41" (1030mm) BOTTOM 9" (230mm) SETBACK R-419HB

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone	Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	2450 lb (1110 kg)	2380 lb (1080 kg)	Block Weight:	1090 lb (500 kg)	1060 lb (480 kg)
Block Volume:	17.13 ft^3 (0.48 m^3)	16.63 ft^3 (0.47 m^3)	Block Volume:	7.63 ft^3 (0.22 m^3)	7.39 ft^3 (0.21 m^3)
Center of Gravity:	20.6" (523 mm)	20.1" (510 mm)	Center of Gravity:	21.6" (548 mm)	21.0" (534 mm)



FULL BOTTOM



HALF BOTTOM

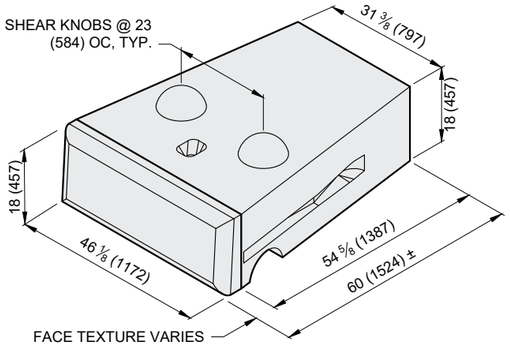
1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Center of Gravity is measured from the back of block.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft^3 (2291kg/m^3).
6. Half blocks contain a fork slot on only one side of the block.
7. Interface Shear knobs are typically 10" (254mm) diameter by 4" (102 mm) tall.

RETAINING BLOCKS

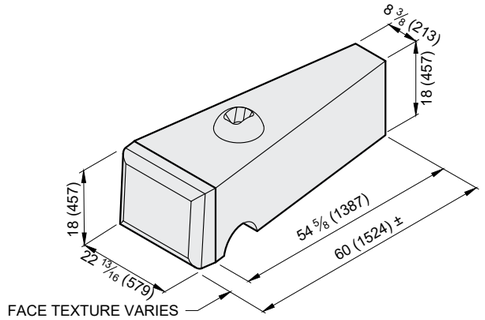
Block Library

R-609M 60" (1520mm) MIDDLE 9" (230mm) SETBACK R-609HM

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone	Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	3300 lb (1500 kg)	3230 lb (1460 kg)	Block Weight:	1340 lb (610 kg)	1310 lb (590 kg)
Block Volume:	23.06 ft^3 (0.65 m^3)	22.56 ft^3 (0.64 m^3)	Block Volume:	9.37 ft^3 (0.26 m^3)	9.12 ft^3 (0.26 m^3)
Center of Gravity:	30.9" (785 mm)	30.3" (770 mm)	Center of Gravity:	33.6" (855 mm)	33.0" (839 mm)



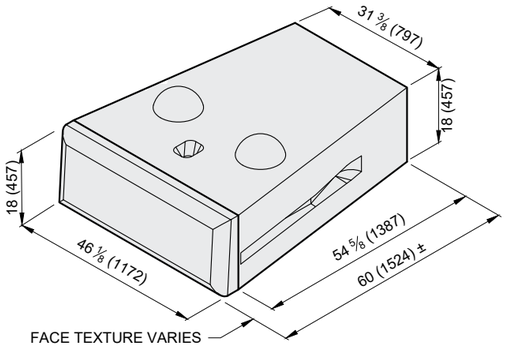
FULL MIDDLE



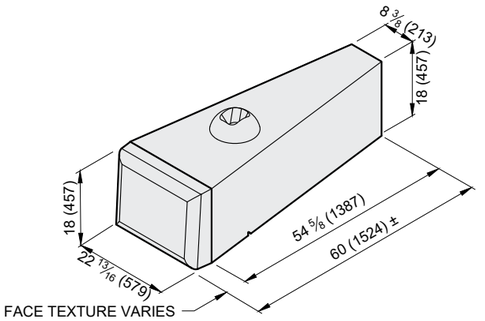
HALF MIDDLE

R-609B 60" (1520mm) BOTTOM 9" (230mm) SETBACK R-609HB

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone	Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	3430 lb (1550 kg)	3360 lb (1520 kg)	Block Weight:	1400 lb (640 kg)	1370 lb (620 kg)
Block Volume:	23.97 ft^3 (0.68 m^3)	23.47 ft^3 (0.66 m^3)	Block Volume:	9.80 ft^3 (0.28 m^3)	9.55 ft^3 (0.27 m^3)
Center of Gravity:	31.5" (800 mm)	30.9" (786 mm)	Center of Gravity:	34.2" (869 mm)	33.6" (854 mm)



FULL BOTTOM



HALF BOTTOM

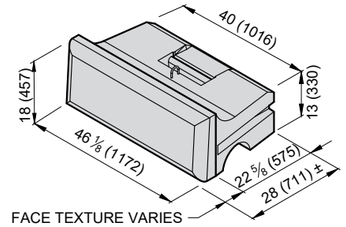
1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Center of Gravity is measured from the back of block.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft^3 (2291kg/m^3).
6. Half blocks contain a fork slot on only one side of the block.
7. Interface Shear knobs are typically 10" (254mm) diameter by 4" (102 mm) tall.
8. 60" (1520 mm) Blocks are typically used at the bottom of taller walls.

RETAINING BLOCKS

Block Library

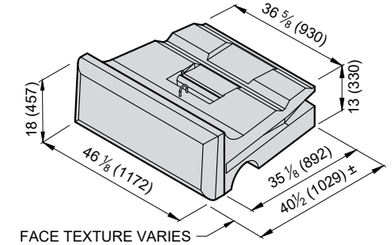
R-28PCT 28" (710mm) PC TOP

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1170 lb (530 kg)	1100 lb (500 kg)
Block Volume:	8.16 ft^3 (0.231 m^3)	7.66 ft^3 (0.217 m^3)
Center of Gravity:	15.3" (388 mm)	14.6" (372 mm)



R-41PCT 41" (1030mm) PC TOP

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1630 lb (740 kg)	1560 lb (710 kg)
Block Volume:	11.38 ft^3 (0.32 m^3)	10.88 ft^3 (0.31 m^3)
Center of Gravity:	21.8" (554 mm)	21.1" (536 mm)



R-28PCM 28" (710mm) PC MIDDLE

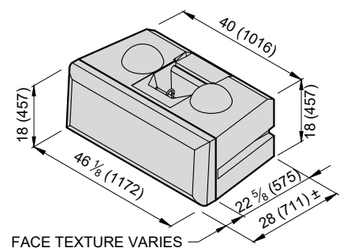
Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1520 lb (690 kg)	1450 lb (660 kg)
Block Volume:	10.62 ft^3 (0.301 m^3)	10.12 ft^3 (0.287 m^3)
Center of Gravity:	14.2" (360 mm)	13.6" (346 mm)

R-41PCM 41" (1030mm) PC MIDDLE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	2170 lb (990 kg)	2100 lb (950 kg)
Block Volume:	15.2 ft^3 (0.43 m^3)	14.69 ft^3 (0.42 m^3)
Center of Gravity:	20.6" (522 mm)	20.0" (508 mm)

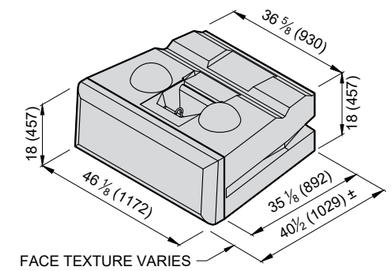
R-28PCB 28" (710mm) PC BOTTOM

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1620 lb (740 kg)	1550 lb (700 kg)
Block Volume:	11.34 ft^3 (0.321 m^3)	10.85 ft^3 (0.307 m^3)
Center of Gravity:	14.2" (362 mm)	13.7" (349 mm)



R-41PCB 41" (1030mm) PC BOTTOM

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	2280 lb (1030 kg)	2210 lb (1000 kg)
Block Volume:	15.92 ft^3 (0.45 m^3)	15.42 ft^3 (0.44 m^3)
Center of Gravity:	20.2" (514mm)	19.7" (501mm)



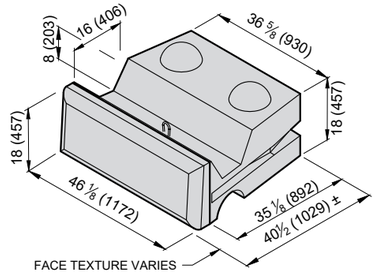
1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Center of Gravity is measured from the back of block.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft^3 (2291kg/m^3).
6. Blocks contain a vertical slot for a 12" (300 mm) strip of geogrid soil reinforcement.
7. Interface Shear knobs are typically 10" (254mm) diameter by 4" (102 mm) tall. Smaller knob diameters are available.

RETAINING BLOCKS

Block Library

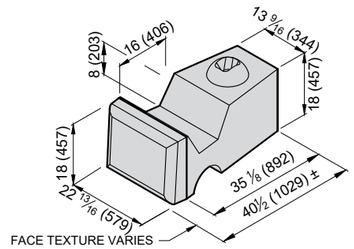
R-41PL 41" (1030mm) PLANTER

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	2010 lb (910 kg)	1930 lb (880 kg)
Block Volume:	14.02 ft^3 (0.40 m^3)	13.53 ft^3 (0.38 m^3)
Center of Gravity:	19.1" (485 mm)	18.4" (468 mm)



R-41HPL 41" (1030mm) HALF PLANTER

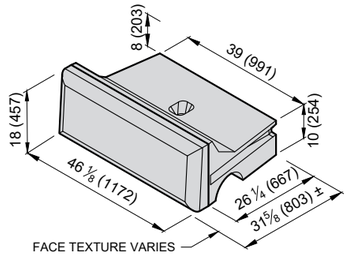
Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	880 lb (400 kg)	840 lb (380 kg)
Block Volume:	6.14 ft^3 (0.17 m^3)	5.89 ft^3 (0.17 m^3)
Center of Gravity:	20.2" (513 mm)	19.5" (495 mm)



R-MT MODIFIED TOP

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1200 lb (540 kg)	1130 lb (510 kg)
Block Volume:	8.38 ft^3 (0.24 m^3)	7.88 ft^3 (0.22 m^3)
Center of Gravity:	17.9" (455 mm)	17.2" (438 mm)

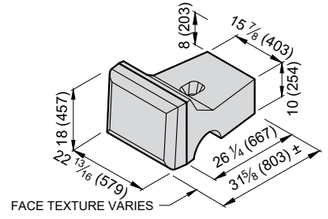
SPECIALITY BLOCK



R-MHT MODIFIED HALF TOP

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	710 lb (320 kg)	640 lb (290 kg)
Block Volume:	4.95 ft^3 (0.14 m^3)	4.45 ft^3 (0.13 m^3)
Center of Gravity:	20.7" (527 mm)	19.8" (504 mm)

SPECIALITY BLOCK



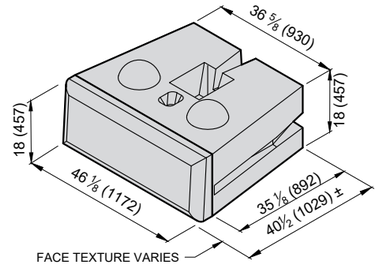
1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Center of Gravity is measured from the back of block.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft^3 (2291kg/m^3).
6. Half blocks contain a fork slot on only one side of the block.
7. Interface Shear knobs are typically 10" (254 mm) diameter by 4" (102 mm) tall.

RETAINING BLOCKS

Block Library

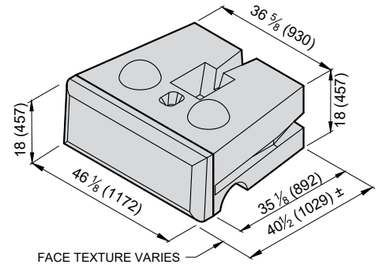
R-AB ANCHOR BOTTOM

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	2370 lb (1070 kg)	2290 lb (1040 kg)
Block Volume:	16.54 ft^3 (0.47 m^3)	16.04 ft^3 (0.45 m^3)
Center of Gravity:	21.0" (533 mm)	20.4" (519 mm)



R-AM ANCHOR MIDDLE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	2240 lb (1010 kg)	2160 lb (980 kg)
Block Volume:	15.63 ft^3 (0.44 m^3)	15.13 ft^3 (0.43 m^3)
Center of Gravity:	20.6" (523 mm)	20.0" (509 mm)

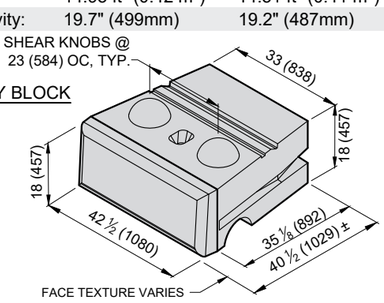


R-SM SHORT MIDDLE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	2140 lb (970 kg)	2080 lb (940 kg)
Block Volume:	14.95 ft^3 (0.42 m^3)	14.51 ft^3 (0.41 m^3)
Center of Gravity:	19.7" (499mm)	19.2" (487mm)

SHEAR KNOBS @ 23 (584) OC, TYP.

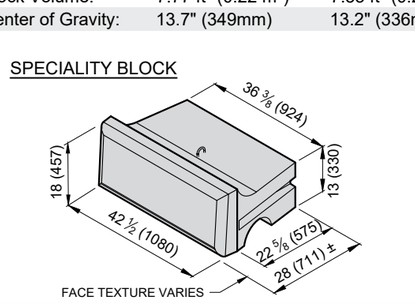
SPECIALITY BLOCK



R-ST SHORT TOP

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1110 lb (500 kg)	1050 lb (480 kg)
Block Volume:	7.77 ft^3 (0.22 m^3)	7.33 ft^3 (0.21 m^3)
Center of Gravity:	13.7" (349mm)	13.2" (336mm)

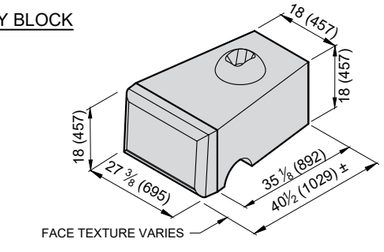
SPECIALITY BLOCK



R-419SM 9" (230mm) SETBACK SHORT MID

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1280 lb (580 kg)	1240 lb (560 kg)
Block Volume:	8.96 ft^3 (0.25 m^3)	8.66 ft^3 (0.24 m^3)
Center of Gravity:	20.0" (507mm)	19.5" (494mm)

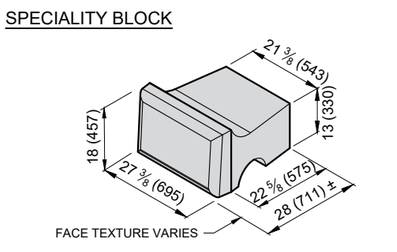
SPECIALITY BLOCK



R-419ST 9" (230mm) SETBACK SHORT TOP

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	710 lb (320 kg)	660 lb (300 kg)
Block Volume:	4.94 ft^3 (0.14 m^3)	4.64 ft^3 (0.13 m^3)
Center of Gravity:	13.9" (352mm)	13.3" (339mm)

SPECIALITY BLOCK

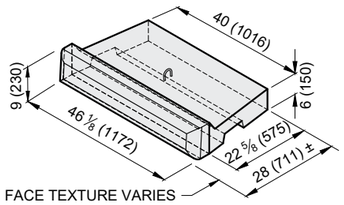


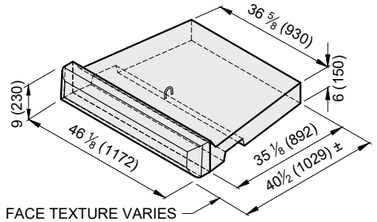
1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Center of Gravity is measured from the back of block.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft^3 (2291kg/m^3).
6. 27" (695) wide blocks contain a fork slot on only one side of the block. These are speciality blocks and may have limited availability and is only used in double 90 degree corner applications.
7. Interface Shear knobs are typically 10" (254mm) diameter by 4" (102 mm) tall. Smaller knob diameters are available.

RETAINING BLOCKS

Block Library

R-28SDT	9" (230 mm) STEPDOWN TOP		R-41SDT	
Face Texture:	Cobble / Limestone	Kingstone / Ledgestone	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	600 lb (270 kg)	500 lb (230 kg)	840 lb (380 kg)	740 lb (340 kg)
Block Volume:	4.2 ft^3 (0.12 m^3)	3.4 ft^3 (0.10 m^3)	5.9 ft^3 (0.17 m^3)	5.1 ft^3 (0.14 m^3)





1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Architectural faces on the blocks have varying texture.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft^3 (2291 kg/m^3).

Project: Walgreens Parking Lot ***Block Manufacturer:*** Redi-Wall ***Installer:*** Leavitt, LLC ***Location:*** Okemos, Michigan ***Completed:*** 2011

FREESTANDING BLOCKS
(FINISHED TEXTURE ON MORE THAN ONE FACE)

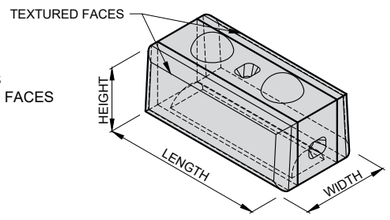
The Redi-Rock Freestanding blocks come in one width and stack in a vertical manner. The defining characteristic is that freestanding blocks have an aesthetic texture cast into multiple faces; the textured face is on at least the two longitudinal vertical faces, and also as required on one end or the top of the blocks. These blocks are machine-placed, wet-cast, precast modular block units manufactured from first purpose, non-reconstituted concrete and intended for constructing dry-stacked modular retaining wall systems. The block units are manufactured from structural-grade concrete mixes in accordance with ASTM C94 or ASTM C685 that produce a finished unit with excellent resistance to freeze-thaw, deicing chemical exposure, and submerged conditions in both fresh water and salt water applications. All Redi-Rock blocks are manufactured and distributed through an international network of individually-owned, licensed precast concrete manufacturers.

CONCRETE MIX PROPERTIES (1)

FREEZE THAW EXPOSURE CLASS (2)	MINIMUM 28 DAY COMPRESSIVE STRENGTH (3)	MAXIMUM WATER CEMENT RATIO	NOMINAL MAXIMUM AGGREGATE SIZE (10)	AGGREGATE CLASS DESIGNATION (4)	AIR CONTENT (5)
MODERATE	4,000 psi (27.6 MPa)	0.45	1.0 (25)	3M	4.5% ± 1.5%
SEVERE	4,000 psi (27.6 MPa)	0.45	1.0 (25)	3S	6.0% ± 1.5%
VERY SEVERE	4,500 psi (30.0 MPa)	0.40	1.0 (25)	4S	6.0% ± 1.5%
MAXIMUM WATER-SOLUBLE CHLORIDE ION (Cl^-) CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT (6,7)					0.15
MAXIMUM CHLORIDE AS Cl^- CONCENTRATION IN MIXING WATER, PARTS PER MILLION					1000
MAXIMUM PERCENTAGE OF TOTAL CEMENTITIOUS MATERIALS BY WEIGHT (8,10) (VERY SEVERE EXPOSURE CLASS ONLY)					
FLY ASH OR OTHER POZZOLANS PER ASTM C618		25	TOTAL ASH, POZZOLANS, SLAG, AND SILICA FUME (9)		50
SLAG CONFORMING TO ASTM C989		50	TOTAL ASH, POZZOLANS, AND SILICA FUME (9)		35
SILICA FUME CONFORMING TO ASTM C1240		10	ALKALI-AGGREGATE REACTIVITY MITIGATION PER ACI 201		

REFERENCE DIMENSIONS:

HEIGHT = VERTICAL DIMENSION OF TEXTURED FACE
LENGTH = LONGER HORIZONTAL DIMENSION PARALLEL TO TEXTURED FACES
WIDTH = HORIZONTAL DIMENSION PERPENDICULAR TO LONGER TEXTURED FACES



DIMENSIONAL TOLERANCES (11) (12)

HEIGHT	ALL BLOCKS	18 ± 3/16 (457 ± 5)
LENGTH	FULL BLOCKS	46 1/8 ± 1/2 (1172 ± 13)
	HALF BLOCKS	22 13/16 ± 1/2 (579 ± 13)
WIDTH	23 -24 (584-610)	13 ± 1/2 (330 ± 13) FORM LINE TO FORM LINE, PLUS APPROX. 5 3/8 (136) FACE TEXTURE ON LONG SIDES

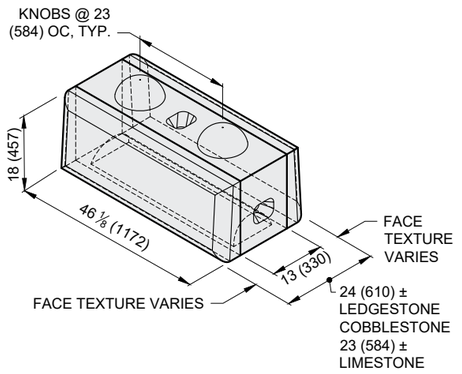
(1) Concrete mix properties are in general accordance with ACI 318 durability requirements. Research has shown that concrete manufactured to these standards demonstrates good durability and performance. When these requirements are followed, specific freeze-thaw testing of the concrete is typically NOT required.
(2) Exposure class is as described in ACI 318.
(3) Test method ASTM C39.
(4) Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete*.
(5) Test method ASTM C231.
(6) Test method ASTM C1218 at age between 28 and 42 days.
(7) Where used in high sulfate environments or where alkali-silica reactivity is and issue, watesoluble chloride shall be limited to no more than trace amounts (from impurities in concrete-making components, not intended constituents.)
(8) The total cementitious material also includes ASTM C150, C595, C845, and C1157 cement. The maximum percentages shall include:
(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.
(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.
(c) Silica fume, ASTM C1240, present in a blended cement.
(9) Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.
(10) Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze-thaw durability in a detailed and current testing program.
(11) All dimensions are shown in units of *inches (mm)*.
(12) Permissible defects: Chips smaller than 1.5 (38) in its largest dimension and cracks not wider than 0.012 (0.305) and not longer than 25% of the nominal height of the block; bug holes in the architectural face smaller than 0.75 (19); and bug holes, water marks, and color variation on non-architectural faces.

FREESTANDING BLOCKS

Block Library

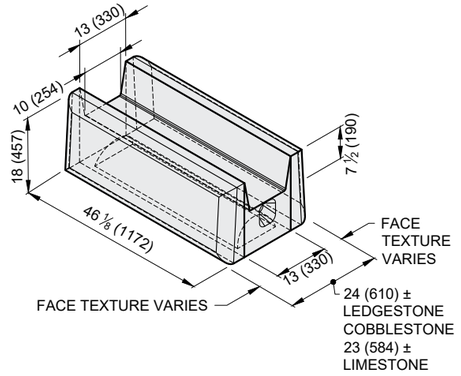
F-SM STRAIGHT MIDDLE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1410 lb (640 kg)	1260 lb (570 kg)
Block Volume:	9.84 ft³ (0.279 m³)	8.84 ft³ (0.250 m³)



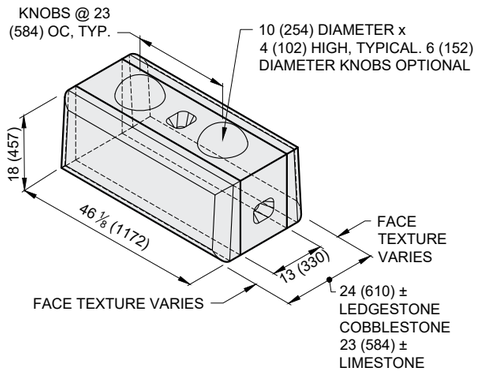
F-SG STRAIGHT GARDEN TOP

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1050 lb (480 kg)	910 lb (410 kg)
Block Volume:	7.35 ft³ (0.208 m³)	6.35 ft³ (0.180 m³)



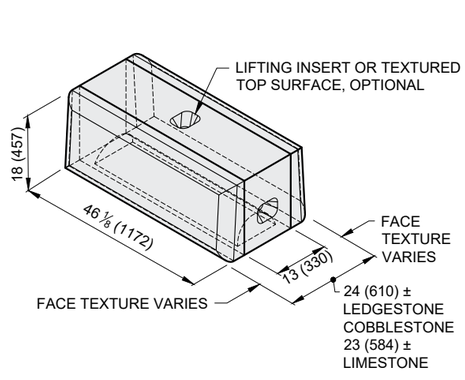
F-SB STRAIGHT BOTTOM

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1520 lb (690 kg)	1380 lb (630 kg)
Block Volume:	10.65 ft³ (0.302 m³)	9.66 ft³ (0.273 m³)



F-ST STRAIGHT TOP

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1380 lb (620 kg)	1230 lb (560 kg)
Block Volume:	9.61 ft³ (0.272 m³)	8.62 ft³ (0.244 m³)



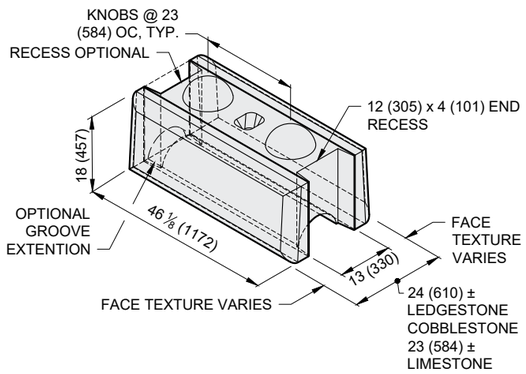
1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Architectural faces on the blocks have varying texture.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft³ (2291 kg/m³).
6. 6" (152 mm) diameter vertical semi-clyindrical voids at the ends of the block for mechanical tie-down are available, refer to Force Protection blocks for additional information.
7. Knobs are typically 10" (254mm) diameter by 4" (102 mm) tall. Smaller knobs are available.

FREESTANDING BLOCKS

Block Library

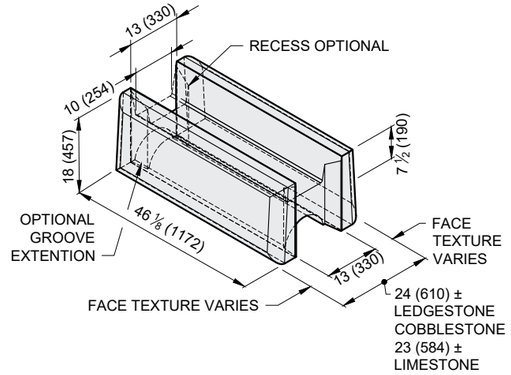
F-VM VARIABLE RADIUS MIDDLE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1270 lb (570 kg)	1120 lb (510 kg)
Block Volume:	8.86 ft^3 (0.251 m^3)	7.86 ft^3 (0.223 m^3)



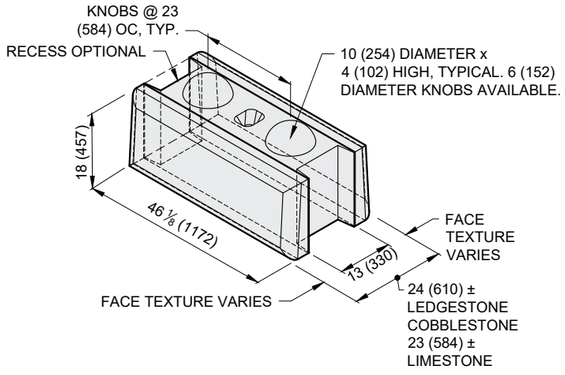
F-VG VARIABLE RADIUS GARDEN TOP

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	970 lb (440 kg)	820 lb (370 kg)
Block Volume:	6.76 ft^3 (0.191 m^3)	5.76 ft^3 (0.163 m^3)



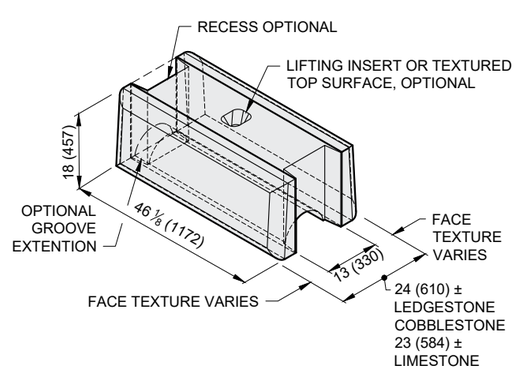
F-VB VARIABLE RADIUS BOTTOM

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1380 lb (630 kg)	1240 lb (560 kg)
Block Volume:	9.65 ft^3 (0.273 m^3)	8.66 ft^3 (0.245 m^3)



F-VT VARIABLE RADIUS TOP

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1240 lb (560 kg)	1090 lb (500 kg)
Block Volume:	8.63 ft^3 (0.244 m^3)	7.64 ft^3 (0.216 m^3)



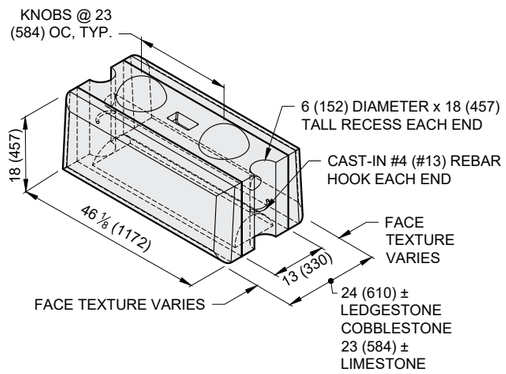
1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Variable radius feature can be cast on only one end, coordinate.
4. Architectural faces on the blocks have varying texture.
5. Actual block volumes and weights may vary.
6. Weights are based upon a concrete density of 143 lb/ft^3 (2291 kg/m^3).
7. Knobs are typically 10" (254 mm) diameter by 4" (102 mm) tall. Smaller knobs are available.

FREESTANDING BLOCKS

Block Library

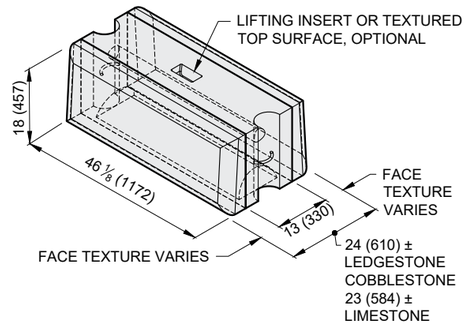
F-FM FORCE PROTECTION MIDDLE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1350 lb (610 kg)	1200 lb (550 kg)
Block Volume:	9.41 ft^3 (0.267 m^3)	8.42 ft^3 (0.238 m^3)



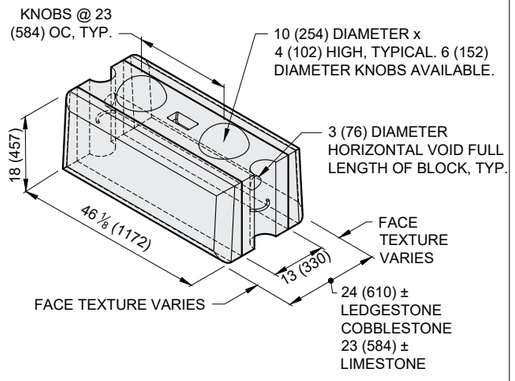
F-FT FORCE PROTECTION TOP

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1310 lb (600 kg)	1170 lb (530 kg)
Block Volume:	9.19 ft^3 (0.260 m^3)	8.19 ft^3 (0.232 m^3)



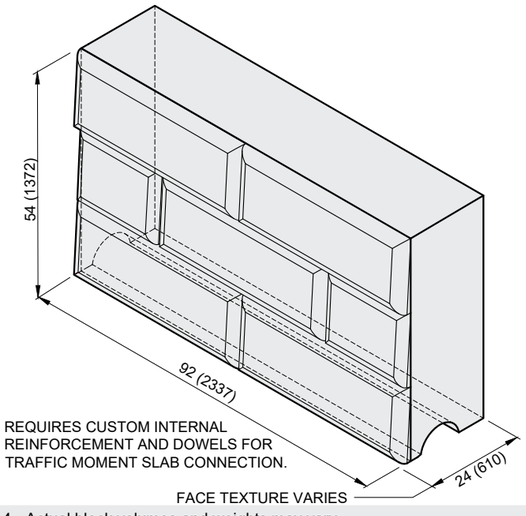
F-FB FORCE PROTECTION BOTTOM

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1460 lb (660 kg)	1320 lb (600 kg)
Block Volume:	10.23 ft^3 (0.290 m^3)	9.23 ft^3 (0.261 m^3)



F-BB BARRIER BLOCK

Block Weight:	9,350 lb (4,240 kg)
Block Volume:	65.4 ft^3 (1.85 m^3)



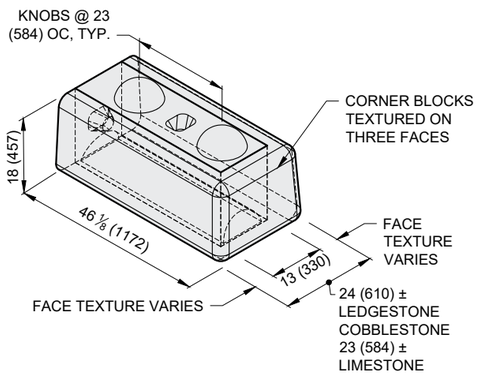
1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Architectural faces on the blocks have varying texture.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft^3 (2291 kg/m^3).
6. Knobs are typically 10" (254mm) diameter by 4" (102 mm) tall. Smaller knobs are available.

FREESTANDING BLOCKS

Block Library

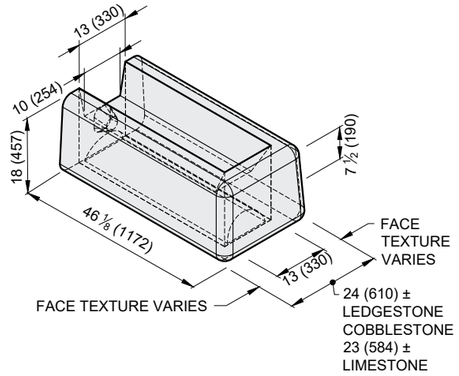
F-CM CORNER MIDDLE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1370 lb (620 kg)	1360 lb (620 kg)
Block Volume:	9.6 ft^3 (0.27m^3)	9.5 ft^3 (0.27m^3)



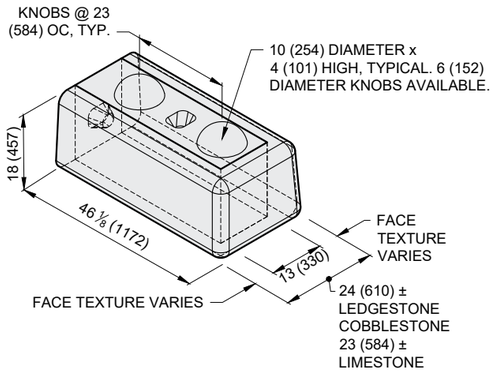
F-CG CORNER GARDEN TOP

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1070 lb (480 kg)	1060 lb (480 kg)
Block Volume:	7.5 ft^3 (0.21m^3)	7.4 ft^3 (0.21m^3)



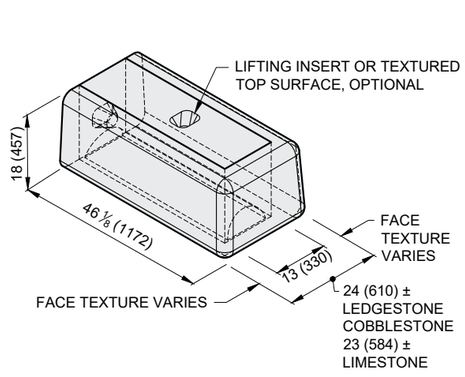
F-CB CORNER BOTTOM

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1490 lb (680 kg)	1480 lb (670 kg)
Block Volume:	10.4 ft^3 (0.30m^3)	10.3 ft^3 (0.29m^3)



F-CT CORNER TOP

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1340 lb (610 kg)	1330 lb (600 kg)
Block Volume:	9.4 ft^3 (0.26m^3)	9.3 ft^3 (0.26m^3)



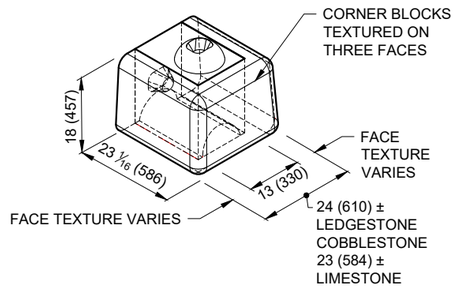
1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Architectural faces on the blocks have varying texture.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft^3 (2291 kg/m^3).
6. Knobs are typically 10" (254mm) diameter by 4" (102 mm) tall. Smaller knobs are available.

FREESTANDING BLOCKS

Block Library

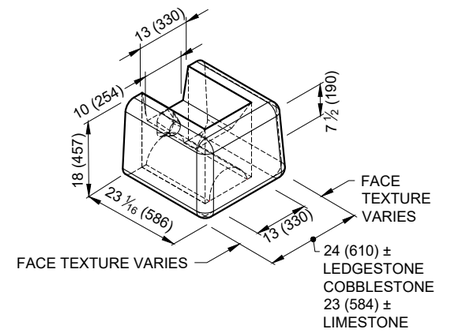
F-HCM HALF CORNER MIDDLE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	660 lb (300 kg)	650 lb (300 kg)
Block Volume:	4.6 ft^3 (0.13m^3)	4.6 ft^3 (0.13m^3)



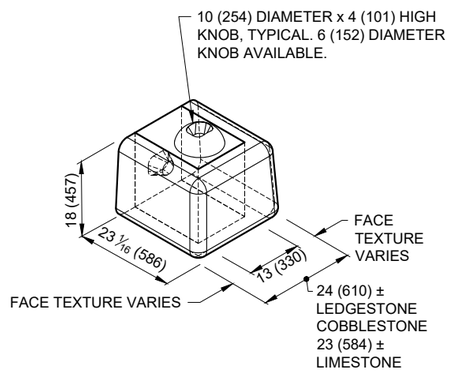
F-HCG HALF CORNER GARDEN TOP

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	530 lb (240 kg)	530 lb (240 kg)
Block Volume:	3.7 ft^3 (0.11m^3)	3.7 ft^3 (0.10m^3)



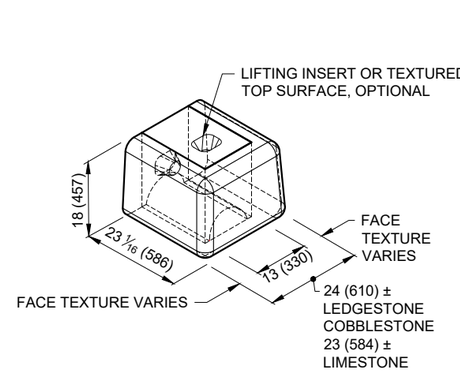
F-HCB HALF CORNER BOTTOM

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	710 lb (320 kg)	700 lb (320 kg)
Block Volume:	5.0 ft^3 (0.14m^3)	4.9 ft^3 (0.14m^3)



F-HCT HALF CORNER TOP

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	640 lb (290 kg)	630 lb (290 kg)
Block Volume:	4.5 ft^3 (0.13m^3)	4.4 ft^3 (0.13m^3)



1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Architectural faces on the blocks have varying texture.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft^3 (2291 kg/m^3).
6. Knobs are typically 10" (254mm) diameter by 4" (102 mm) tall. Smaller knobs are available.

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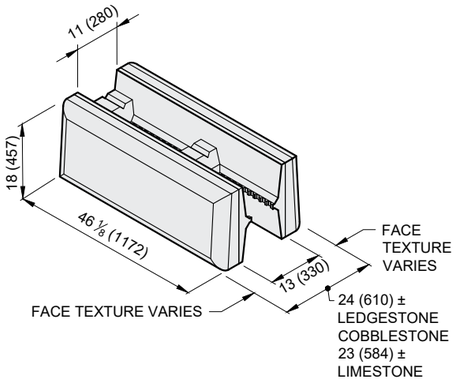
FREESTANDING BLOCKS

Block Library

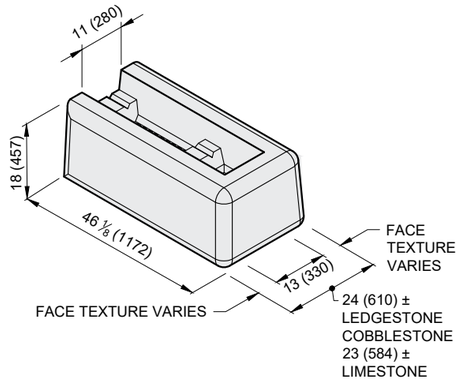
F-HC HOLLOW-CORE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	910 lb (410 kg)	770 lb (350 kg)
Block Volume:	6.38 ft^3 (0.181 m^3)	5.38 ft^3 (0.152 m^3)
Infill Volume:	4.09 ft^3 (0.116 m^3)	



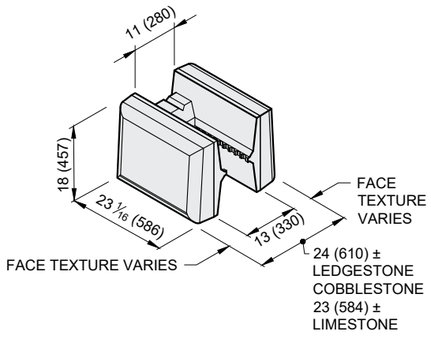
F-CHC CORNER HOLLOW-CORE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1000 lb (460 kg)	970 lb (440 kg)
Block Volume:	7.01 ft^3 (0.198 m^3)	6.80 ft^3 (0.192 m^3)
Infill Volume:	3.37 ft^3 (0.095 m^3)	



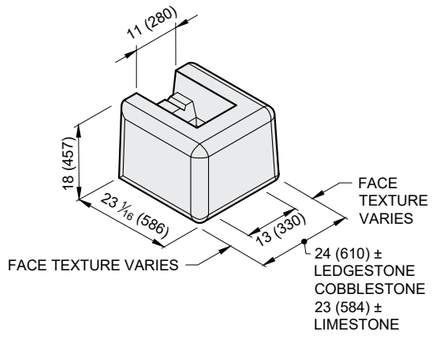
F-HHC HALF HOLLOW-CORE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	460 lb (210 kg)	390 lb (180 kg)
Block Volume:	3.19 ft^3 (0.090 m^3)	2.69 ft^3 (0.076 m^3)
Infill Volume:	2.04 ft^3 (0.058 m^3)	



F-HCHC HALF CORNER HOLLOW-CORE

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	550 lb (250 kg)	510 lb (230 kg)
Block Volume:	3.81 ft^3 (0.108 m^3)	3.53 ft^3 (0.100 m^3)
Infill Volume:	1.31 ft^3 (0.037 m^3)	



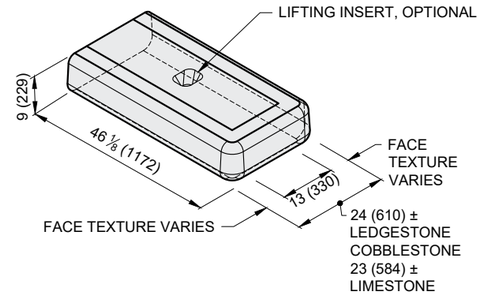
1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Confirm block production with licensed Redi-Rock manufacturer.
3. Architectural faces on the blocks have varying texture.
4. Average block weights shown. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft^3 (2291 kg/m^3).

FREESTANDING BLOCKS

Block Library

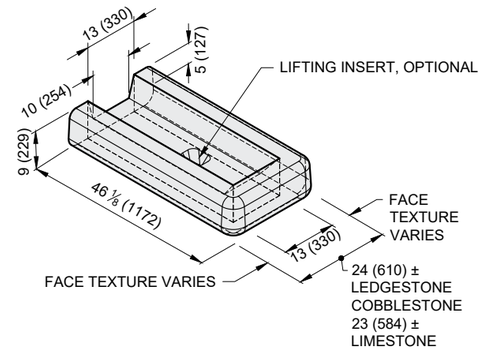
F-9SC 9" (230) STEPDOWN CORNER

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	740 lb (340 kg)	660 lb (300 kg)
Block Volume:	5.17 ft^3 (0.146 m^3)	4.60 ft^3 (0.130 m^3)



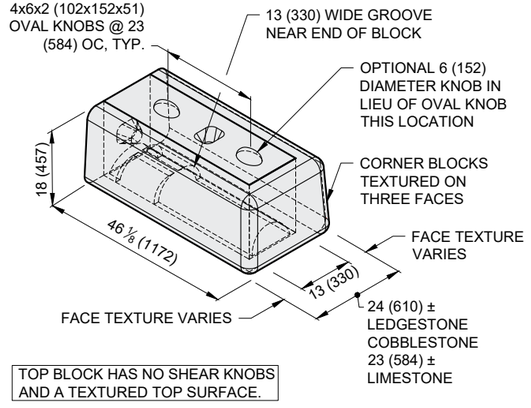
F-9SG 9" (230) STEPDOWN GARDEN

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	550 lb (250 kg)	470 lb (210 kg)
Block Volume:	3.86 ft^3 (0.109 m^3)	3.30 ft^3 (0.093 m^3)



F-90C 90 DEGREE CORNER

Face Texture:	Cobble / Limestone	Kingstone / Ledgestone
Block Weight:	1330 lb (600 kg)	1320 lb (600 kg)
Block Volume:	9.3 ft^3 (0.26m^3)	9.2 ft^3 (0.26m^3)



1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Architectural faces on the blocks have varying texture.
4. Actual block volumes and weights may vary.
5. Weights are based upon a concrete density of 143 lb/ft^3 (2291 kg/m^3).

ACCESSORY BLOCKS
(COLUMNS, STEPS, AND CAPS)

The Redi-Rock Column and Accessory blocks come in multiple widths and configurations. The defining characteristic is that these blocks have an aesthetic texture cast into two or more faces, and create columns, caps, and steps that complement both Retaining and Freestanding blocks. These blocks are machine-placed, wet-cast, precast modular block units manufactured from first purpose, non-reconstituted concrete and intended for constructing dry-stacked modular features that coordinate with retaining walls. The block units are manufactured from structural-grade concrete mixes in accordance with ASTM C94 or ASTM C685 that produce a finished unit with excellent resistance to freeze-thaw, deicing chemical exposure, and submerged conditions in both fresh water and salt water applications. All Redi-Rock blocks are manufactured and distributed through an international network of individually-owned, licensed precast concrete manufacturers.

CONCRETE MIX PROPERTIES [1]

FREEZE THAW EXPOSURE CLASS [2]	MINIMUM 28 DAY COMPRESSIVE STRENGTH [3]	MAXIMUM WATER CEMENT RATIO	NOMINAL MAXIMUM AGGREGATE SIZE [10]	AGGREGATE CLASS DESIGNATION [4]	AIR CONTENT [5]
MODERATE	4,000 psi (27.6 MPa)	0.45	1.0 (25)	3M	4.5% ± 1.5%
SEVERE	4,000 psi (27.6 MPa)	0.45	1.0 (25)	3S	6.0% ± 1.5%
VERY SEVERE	4,500 psi (30.0 MPa)	0.40	1.0 (25)	4S	6.0% ± 1.5%

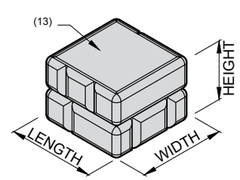
MAXIMUM WATER-SOLUBLE CHLORIDE ION (Cl^-) CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT [6,7]	0.15
MAXIMUM CHLORIDE AS Cl^- CONCENTRATION IN MIXING WATER, PARTS PER MILLION	1000

MAXIMUM PERCENTAGE OF TOTAL CEMENTITIOUS MATERIALS BY WEIGHT [8,10] (VERY SEVERE EXPOSURE CLASS ONLY)

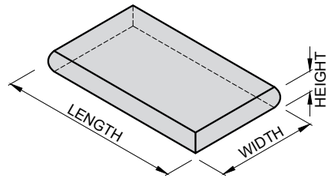
FLY ASH OR OTHER POZZOLANS PER ASTM C618	25	TOTAL ASH, POZZOLANS, SLAG, AND SILICA FUME [9]	50
SLAG CONFORMING TO ASTM C989	50	TOTAL ASH, POZZOLANS, AND SILICA FUME [9]	35
SILICA FUME CONFORMING TO ASTM C1240	10	ALKALI-AGGREGATE REACTIVITY MITIGATION PER ACI 201	

REFERENCE DIMENSIONS:

HEIGHT = VERTICAL DIMENSION OF TEXTURED FACE
LENGTH = LONGER HORIZONTAL DIMENSION OF TEXTURED FACE
WIDTH = SHORTER HORIZONTAL DIMENSION



COLUMN BLOCK



CAP/ STEP BLOCK

DIMENSIONAL TOLERANCES [11][12]

	COLUMN BLOCKS	CAP/ STEP BLOCKS
HEIGHT	18 ± 3/16 (457 ± 5)	6 ± 3/16 (152 ± 5)
LENGTH	24 ± ½ (610 ± 13)	VARIES ± ½ (VARIES ± 13)
WIDTH	24 ± ½ (610 ± 13)	28½ ± ½ (724 ± 13)

[1] Concrete mix properties are in general accordance with ACI 318 durability requirements. Research has shown that concrete manufactured to these standards demonstrates good durability and performance. When these requirements are followed, specific freeze-thaw testing of the concrete is typically NOT required.
[2] Exposure class is as described in ACI 318.
[3] Test method ASTM C39.
[4] Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete.*
[5] Test method ASTM C231.
[6] Test method ASTM C1218 at age between 28 and 42 days.
[7] Where used in high sulfate environments or where alkali-silica reactivity is and issue, watesoluble chloride shall be limited to no more than trace amounts (from impurities in concrete-making components, not intended constituents.)
[8] The total cementitious material also includes ASTM C150, C595, C845, and C1157 cement. The maximum percentages shall include:
(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.
(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.
(c) Silica fume, ASTM C1240, present in a blended cement.
[9] Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.
[10] Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze-thaw durability in a detailed and current testing program.
[11] All dimensions are shown in units of *inches (mm)*.
[12] Permissible defects: Chips smaller than 1.5" (38mm) in its largest dimension and cracks not wider than 0.012" (0.305mm) and not longer than 25% of the nominal height of the block; bug holes in the architectural face smaller than 0.75" (19mm); and bug holes, water marks, and color variation on non-architectural faces.
[13] Column blocks have a smooth troweled finish on horizontal faces.

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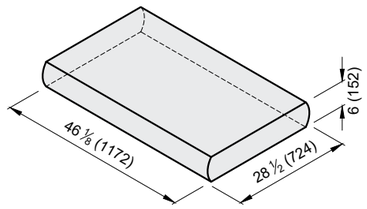
ACCESSORIES (CAP AND STEP BLOCKS)

Block Library

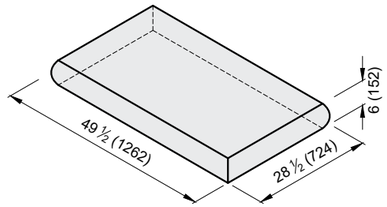
A-2SC TWO-SIDED

Block Weight:	630 lb (290 kg)
Block Volume:	4.42 ft^3 (0.125 m^3)



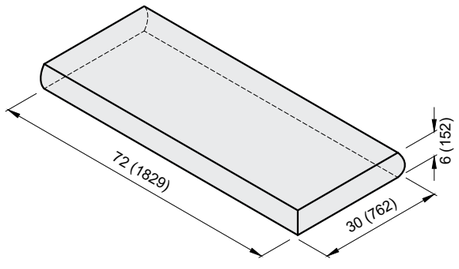
A-4SC FOUR-SIDED

Block Weight:	670 lb (300 kg)
Block Volume:	4.65 ft^3 (0.132 m^3)



A-3SC72 THREE-SIDED 72"

Block Weight:	1040 lb (470 kg)
Block Volume:	7.3 ft^3 (0.21 m^3)



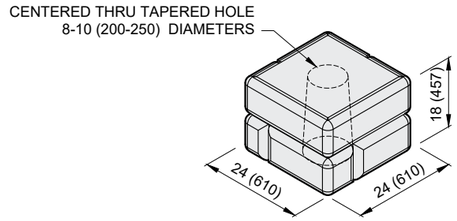
1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Actual block volumes and weights may vary.
4. Weights are based upon a concrete density of 143 lb/ft^3 (2291 kg/m^3).

ACCESSORIES (COLUMN BLOCKS)

Block Library

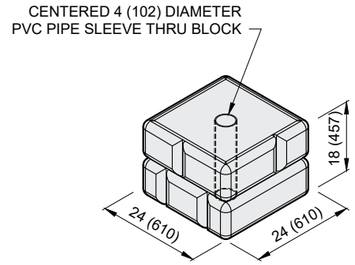
A-COL8 COLUMN - 8" (203mm) CORE

Block Weight:	730 lb (330 kg)
Block Volume:	5.1 ft^3 (0.14 m^3)



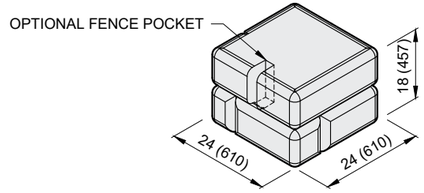
A-COL4 COLUMN - 4" (102mm) CORE

Block Weight:	810 lb (370 kg)
Block Volume:	5.6 ft^3 (0.16 m^3)



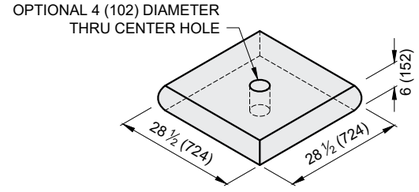
A-COLS COLUMN - SOLID CORE

Block Weight:	830 lb (380 kg)
Block Volume:	5.8 ft^3 (0.16 m^3)



A-CC COLUMN CAP

Block Weight:	390 lb (180 kg)
Block Volume:	2.7 ft^3 (0.08 m^3)

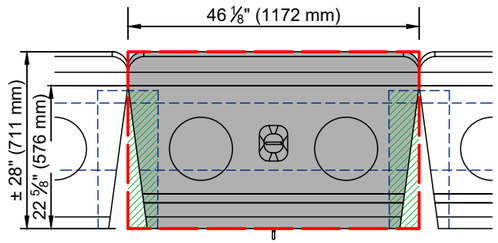


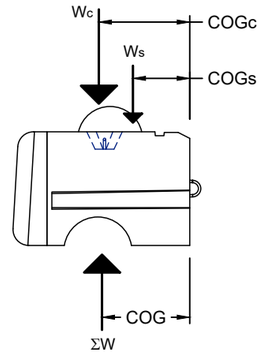
1. Units for dimensions are inches (mm), typical unless noted otherwise.
2. Block production varies with each licensed Redi-Rock manufacturer. Confirm availability before Specifying or Ordering.
3. Actual block volumes and weights may vary.
4. Weights are based upon a concrete density of 143 lb/ft^3 (2291 kg/m^3).
5. Weight and volume ranges represents the blocks with the maximum hole size shown and with no hole.
6. Optional fence rail pockets available upon request. Typical pocket size is: 2 (50) wide x 5 (130) deep x 9 (230) tall.

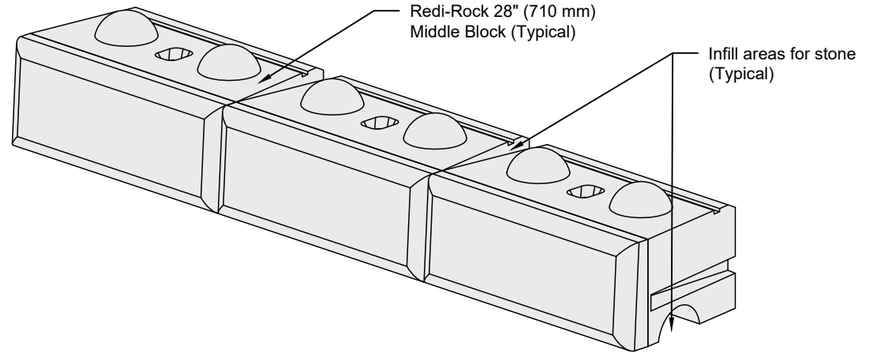
DESIGN INFORMATION

Infill Weight Calculations

R-28M 28" (710 mm) MIDDLE BLOCK WITH SOIL INFILL







INFILLED UNIT WEIGHT CALCULATIONS

CONCRETE

Design Unit Weight = 143 pcf (2291 kg/m^3)

LIMESTONE AND COBBLESTONE FACE TEXTURE

Average Volume (Vc)	11.28 cft (0.32 m^3) (From CAD Model)
Concrete Block Weight (Wc)	Wc = 11.28 cft x 143 pcf = 1,613 lbs (732 kg)

KINGSTONE AND LEDGESTONE FACE TEXTURE

Average Volume (Vc)	10.78 cft (0.31 m^3) (From CAD Model)
Concrete Block Weight (Wc)	Wc = 10.78 cft x 143 pcf = 1,542 lbs (699 kg)
Average Center of Gravity (COGc)	13.9 in (353 mm) (From CAD Model)

INFILL SOIL

Design Unit Weight = 100 pcf (1602 kg/m^3)

Soil considered as infill includes the soil between adjacent blocks and at the ends of the bottom groove in the block.

Volume (Vs)	1.05 cft (0.03 m^3) (From CAD Model)
Infill Soil Weight (Ws)	Ws = 1.05 cft x 100 pcf = 105 lbs (47.7 kg)
Center of Gravity (COGs)	13.6 in (345 mm) (Data from CAD Model)

DESIGN VOLUME

28 in x 46.125 in x 18 in = 13.45 cft
(0.711 m x 1.172 m x 0.457 m = 0.38m^3)

INFILLED UNIT WEIGHT

LIMESTONE AND COBBLESTONE FACE TEXTURE
γ_{INFILL} = (1,613 lb + 105 lb) / 13.45 cft = **127.7 pcf**
((733 kg + 48 kg) / 0.381 m^3 = 2045 kg/m^3)

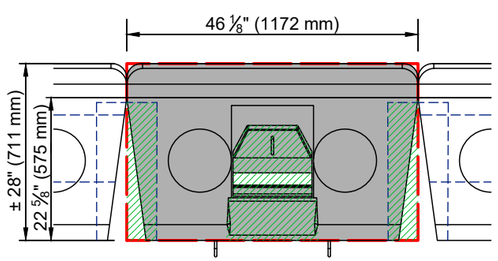
KINGSTONE AND LEDGESTONE FACE TEXTURE
γ_{INFILL} = (1,542 lb + 105 lb) / 13.45 cft = **122.4 pcf**
((701 kg + 48 kg) / 0.381 m^3 =1960 kg/m^3)

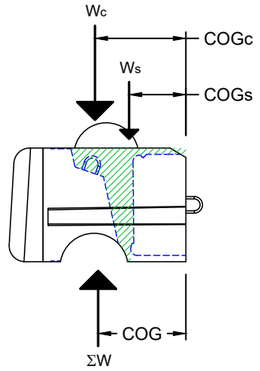
NOTE: The infilled unit weights shown here are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis.

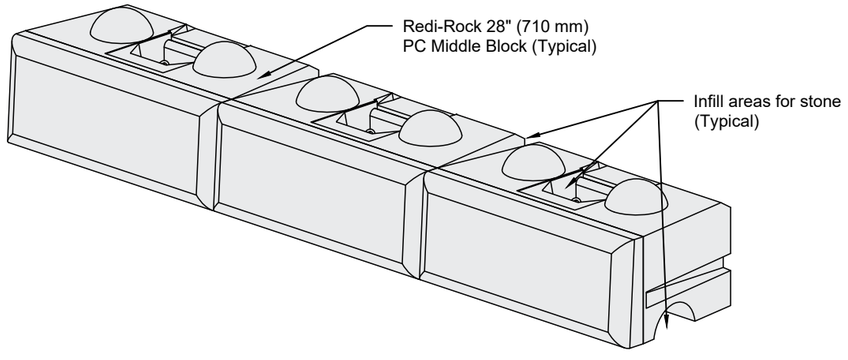
RETAINING BLOCKS

Infill Weight Calculations

R-28PCM 28" (710 mm) POSITIVE CONNECTION (PC) MIDDLE BLOCK WITH SOIL INFILL







INFILLED UNIT WEIGHT CALCULATIONS

CONCRETE

Design Unit Weight = 143 pcf (2291 kg/m^3)

LIMESTONE AND COBBLESTONE FACE TEXTURE

Average Volume (Vc)	10.62 cft (0.30 m^3) (From CAD Model)
Concrete Block Weight (Wc)	Wc = 10.62 cft x 143 pcf = 1,519 lbs (690 kg)

KINGSTONE AND LEDGESTONE FACE TEXTURE

Average Volume (Vc)	10.12 cft (0.29 m^3) (From CAD Model)
Concrete Block Weight (Wc)	Wc = 10.12 cft x 143 pcf = 1,447 lbs (658 kg)
Average Center of Gravity (COGc)	14.0 in (356 mm) (From CAD Model)

INFILL SOIL

Design Unit Weight = 100 pcf (1602 kg/m^3)

Soil considered as infill includes the soil between adjacent blocks, in the geogrid slot, and at the ends of the bottom groove in the block.

Volume (Vs)	1.73 cft (0.05 m^3) (From CAD Model)
Infill Soil Weight (Ws)	Ws = 1.73 cft x 100 pcf = 173 lbs (79 kg)
Center of Gravity (COGs)	9.9 in (251 mm) (Data from CAD Model)

DESIGN VOLUME

28 in x 46.125 in x 18 in = 23,247 in^3 = 13.45 cft
(0.711 m x 1.172 m x 0.457 m = 0.38m^3)

INFILLED UNIT WEIGHT

LIMESTONE AND COBBLESTONE FACE TEXTURE

γ_{INFILL} = (1,519 lb + 173 lb) / 13.45 cft = **125.8 pcf**
((690 kg + 79 kg) / 0.381 m^3 = 2015 kg/m^3)

KINGSTONE AND LEDGESTONE FACE TEXTURE

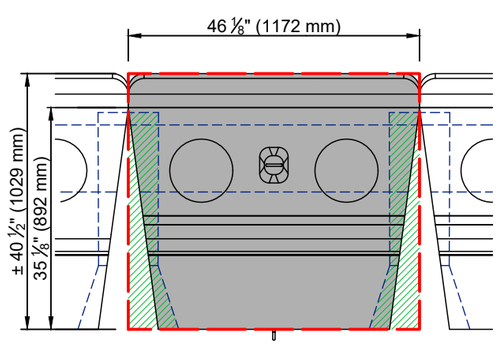
γ_{INFILL} = (1,447 lb + 173 lb) / 13.45 cft = **120.4 pcf**
((658 kg + 79 kg) / 0.381 m^3 = 1629 kg/m^3)

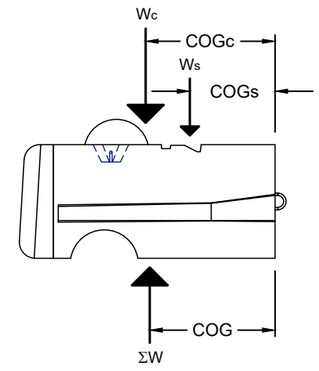
NOTE: The infilled unit weights shown here are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis.

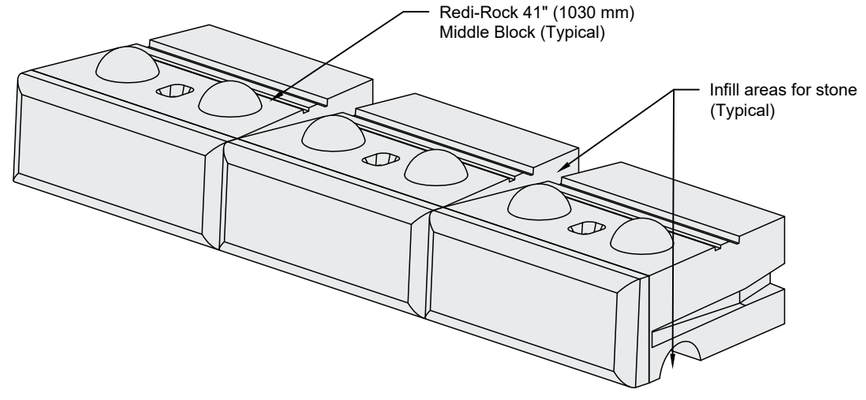
RETAINING BLOCKS

Infill Weight Calculations

R-41M 41" (1030 mm) MIDDLE BLOCK WITH SOIL INFILL







INFILLED UNIT WEIGHT CALCULATIONS

CONCRETE

Design Unit Weight = 143 pcf (2291 kg/m^3)

LIMESTONE AND COBBLESTONE FACE TEXTURE

Average Volume (Vc)	16.14 cft (0.457 m^3) (From CAD Model)
Concrete Block Weight (Wc)	Wc = 16.14 cft x 143 pcf = 2,308 lbs (1048 kg)

KINGSTONE AND LEDGESTONE FACE TEXTURE

Average Volume (Vc)	15.65 cft (0.443 m^3) (From CAD Model)
Concrete Block Weight (Wc)	Wc = 15.65 cft x 143 pcf = 2,238 lbs (1015 kg)
Average Center of Gravity (COGc)	20.5 in (521 mm) (From CAD Model)

INFILL SOIL

Design Unit Weight = 100 pcf (1602 kg/m^3)

Soil considered as infill includes the soil between adjacent blocks and at the ends of the bottom groove in the block.

Volume (Vs)	2.18 cft (0.062 m^3) (From CAD Model)
Infill Soil Weight (Ws)	Ws = 2.18 cft x 100 pcf = 218 lbs (99.1 kg)
Center of Gravity (COGs)	13.5 in (342 mm) (Data from CAD Model)

DESIGN VOLUME

40.5 in x 46.125 in x 18 in = 19.46 cft
(1.03 m x 1.172 m x 0.457 m = 0.55 m^3)

INFILLED UNIT WEIGHT

LIMESTONE AND COBBLESTONE FACE TEXTURE

γ_{INFILL} = (2,308 lb + 218 lb) / 19.46 cft = **129.8 pcf**
((1049 kg + 99 kg) / 0.551 m^3 = 2079 kg/m^3)

KINGSTONE AND LEDGESTONE FACE TEXTURE

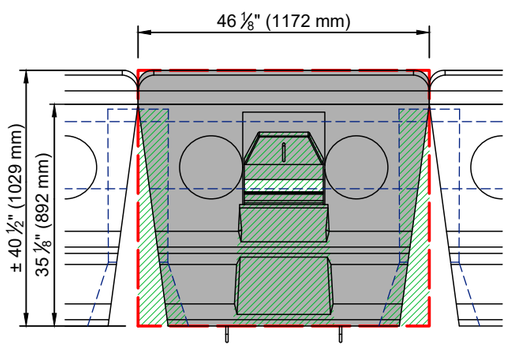
γ_{INFILL} = (2,238 lb + 218 lb) / 19.46 cft = **126.2 pcf**
((1017 kg + 99 kg) / 0.551 m^3 =2021 kg/m^3)

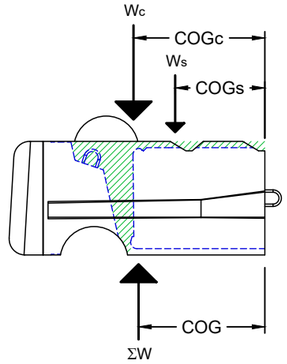
NOTE: The infilled unit weights shown here are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis.

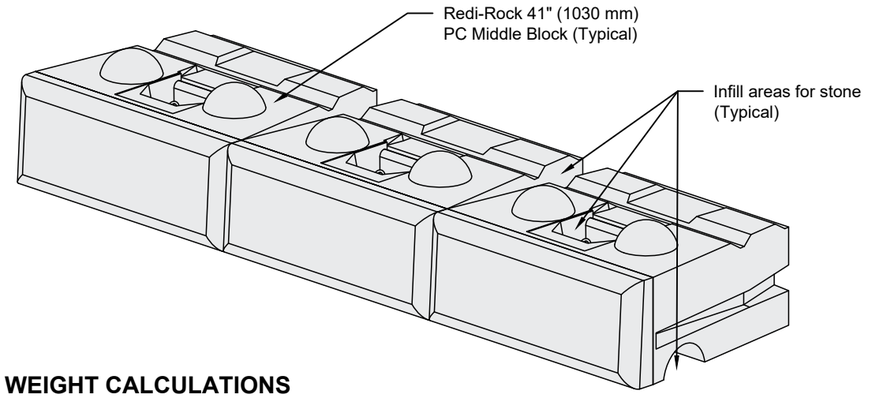
RETAINING BLOCKS

Infill Weight Calculations

R-41PCM 41" (1030 mm) POSITIVE CONNECTION (PC) MIDDLE BLOCK WITH SOIL INFILL







INFILLED UNIT WEIGHT CALCULATIONS

CONCRETE

Design Unit Weight = 143 pcf (2291 kg/m^3)

LIMESTONE AND COBBLESTONE FACE TEXTURE

Average Volume (Vc)	15.19 cft (0.43 m^3) (From CAD Model)
Concrete Block Weight (Wc)	Wc = 15.19 cft x 143 pcf = 2,172 lbs (987 kg)

KINGSTONE AND LEDGESTONE FACE TEXTURE

Average Volume (Vc)	14.69 cft (0.42 m^3) (From CAD Model)
Concrete Block Weight (Wc)	Wc = 14.69 cft x 143 pcf = 2,101 lbs (955 kg)
Average Center of Gravity (COGc)	20.4 in (518 mm) (From CAD Model)

INFILL SOIL

Design Unit Weight = 100 pcf (1602 kg/m^3)

Soil considered as infill includes the soil between adjacent blocks, in the geogrid slot, and at the ends of the bottom groove in the block.

Volume (Vs)	2.92 cft (0.08 m^3) (From CAD Model)
Infill Soil Weight (Ws)	Ws = 2.92 cft x 100 pcf = 292 lbs (133 kg)
Center of Gravity (COGs)	15.6 in (396 mm) (Data from CAD Model)

DESIGN VOLUME

40.5 in x 46.125 in x 18 in = 33,625 in^3 = 19.46 cft
(1.03 m x 1.172 m x 0.457 m = 0.55 m^3)

INFILLED UNIT WEIGHT

LIMESTONE AND COBBLESTONE FACE TEXTURE

γ_{INFILL} = (2,172 lb + 292 lb) / 19.46 cft = **126.6 pcf**
((987 kg x 133 kg) / 0.551 m^3 = 2030 kg/m^3)

KINGSTONE AND LEDGESTONE FACE TEXTURE

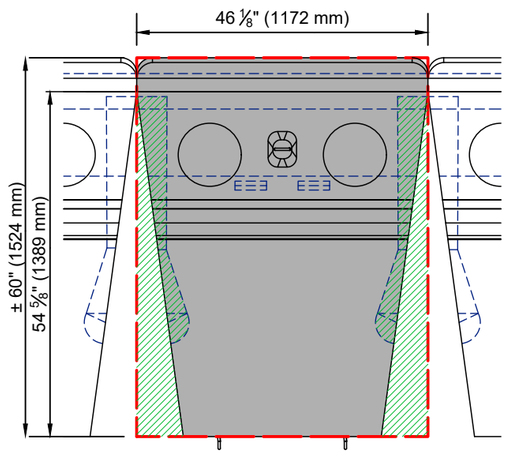
γ_{INFILL} = (2,101 lb + 292 lb) / 19.46 cft = **123.0 pcf**
((955 kg x 133 kg) / 0.551 m^3 = 1970 kg/m^3)

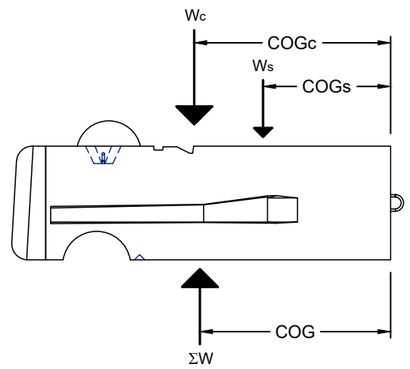
NOTE: The infilled unit weights shown here are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis.

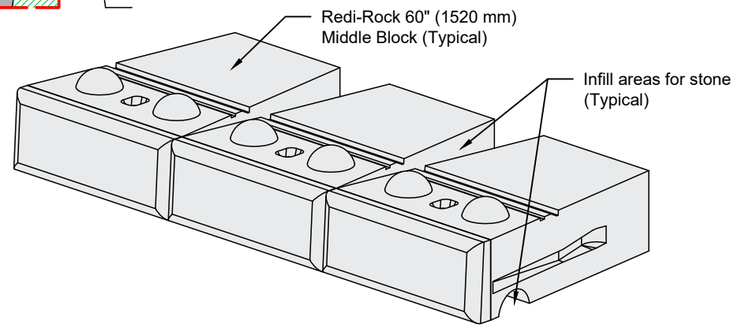
RETAINING BLOCKS

Infill Weight Calculations

R-60M 60" (1520 mm) MIDDLE BLOCK WITH SOIL INFILL







INFILLED UNIT WEIGHT CALCULATIONS

CONCRETE

Design Unit Weight = 143 pcf (2291 kg/m^3)

LIMESTONE AND COBBLESTONE FACE TEXTURE

Average Volume (Vc)	23.00 cft (0.651m^3) (From CAD Model)
Concrete Block Weight (Wc)	Wc = 23.0 cft x 143 pcf = 3,287 lbs (1491 kg)

KINGSTONE AND LEDGESTONE FACE TEXTURE

Average Volume (Vc)	22.49 cft (0.637 m^3) (From CAD Model)
Concrete Block Weight (Wc)	Wc = 22.49 cft x 143 pcf = 3,216 lbs (1458 kg)
Average Center of Gravity (COGc)	31.1 in (790 mm) (From CAD Model)

INFILL SOIL

Design Unit Weight = 100 pcf (1602 kg/m^3)

Soil considered as infill includes the soil between adjacent blocks and at the ends of the bottom groove in the block.

Volume (Vs)	4.70 cft (0.133 m^3) (From CAD Model)
Infill Soil Weight (Ws)	Ws = 4.70 cft x 100 pcf = 470 lbs (214 kg)
Center of Gravity (COGs)	20.2 in (513mm) (Data from CAD Model)

DESIGN VOLUME

60 in x 46.125 in x 18 in = 28.83 cft
(1.524 m x 1.172 m x 0.457 m = 0.816 m^3)

INFILLED UNIT WEIGHT

LIMESTONE AND COBBLESTONE FACE TEXTURE

γ_{INFILL} = (3,288 lb + 470 lb) / 28.83 cft = **130.4 pcf**
((1495 kg + 214 kg) / 0.816 m^3 = 2089 kg/m^3)

KINGSTONE AND LEDGESTONE FACE TEXTURE

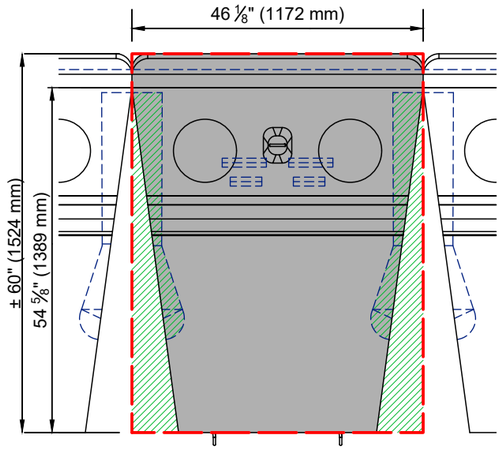
γ_{INFILL} = (3,216 lb + 470 lb) / 28.83 cft = **127.9 pcf**
((1462 kg + 214 kg) / 0.816 m^3 = 2050 kg/m^3)

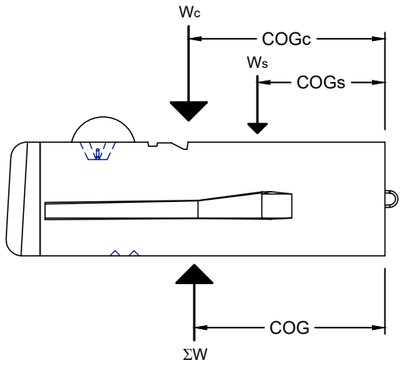
NOTE: The infilled unit weights shown here are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis.

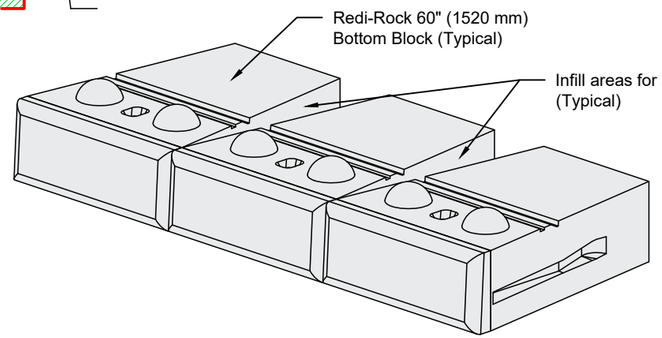
RETAINING BLOCKS

Infill Weight Calculations

R-60B 60" (1520 MM) BOTTOM BLOCK WITH SOIL INFILL







INFILLED UNIT WEIGHT CALCULATIONS

CONCRETE

Design Unit Weight = 143 pcf (2291 kg/m^3)

LIMESTONE AND COBBLESTONE FACE TEXTURE

Average Volume (Vc)	23.90 cft (0.677 m^3) (From CAD Model)
Concrete Block Weight (Wc)	Wc = 23.90 cft x 143 pcf = 3,418 lbs

KINGSTONE AND LEDGESTONE FACE TEXTURE

Average Volume (Vc)	23.40 cft (From CAD Model)
Concrete Block Weight (Wc)	Wc = 23.40 cft x 143 pcf = 3,346 lbs
Average Center of Gravity (COGc)	31.6 in from Back of Block (From CAD Model)

INFILL SOIL

Design Unit Weight = 100 pcf (1602 kg/m^3)

Soil considered as infill includes the soil between adjacent blocks and at the ends of the bottom groove in the block.

Volume (Vs)	4.58 cft (From CAD Model)
Infill Soil Weight (Ws)	Ws = 4.58 cft x 100 pcf = 458 lbs
Center of Gravity (COGs)	19.5 in from Back of Block (Data from CAD Model)

DESIGN VOLUME

60 in x 46.125 in x 18 in = 49,815 in^3 = 28.83 cft
(1.524 m x 1.172 m x 0.457 m = 0.816 m^3)

INFILLED UNIT WEIGHT

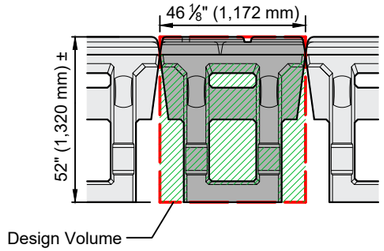
LIMESTONE AND COBBLESTONE FACE TEXTURE
γ_{INFILL} = (3,418 lb + 458 lb) / 28.83 cft = **134.4 pcf**
((1554 kg + 208 kg) / 0.816 m^3 = 2153 kg/m^3)

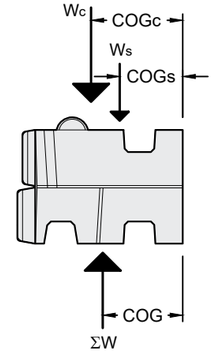
KINGSTONE AND LEDGESTONE FACE TEXTURE
γ_{INFILL} = (3,346 lb + 458 lb) / 28.83 cft = **131.9 pcf**
((1521 kg + 208 kg) / 0.816 m^3 =2113 kg/m^3)

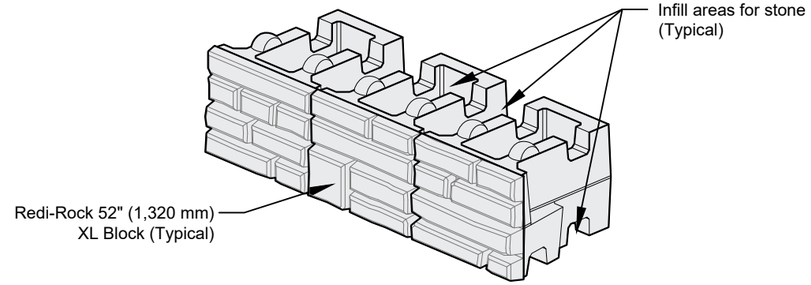
NOTE: The infilled unit weights shown here are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis.

Infill Weight Calculations

R-5236HC 52" (1,320 mm) XL HOLLOW-CORE RETAINING BLOCK WITH SOIL INFILL







INFILLED UNIT WEIGHT CALCULATIONS

CONCRETE

Design Unit Weight = 143 pcf (2,291 kg/m^3)

LEDGESTONE FACE TEXTURE

Average Volume (Vc)	23.29 cft (0.66 m^3) (From CAD Model)
Concrete Block Weight (Wc)	23.29 cft x 143 pcf = 3,331 lbs (1,511 kg)
Average Center of Gravity (COGc)	29.0 in (737 mm) (From CAD Model)

INFILL

Design Unit Weight = 100 pcf (1,602 kg/m^3)

Material considered as infill includes the crushed stone between adjacent blocks and in the hollow cores within the blocks.

Volume (Vs)	22.88 cft (0.65 m^3) (From CAD Model)
Infill Soil Weight (Ws)	22.88 cft x 100 pcf = 2,288 lbs (1,038 kg)
Center of Gravity (COGs)	20.0 in (507 mm) (From CAD Model)

DESIGN VOLUME & CENTER OF GRAVITY

52 in x 46.125 in x 36 in = 49.97 cft
(1.321 m x 1.172 m x 0.914 m = 1.415 m^3)
COG = (29.0 in (3,331 lbs) + 20.0 in (2,288 lbs))/(3,331 lbs + 2,288 lbs) = 25.34 in (644 mm)

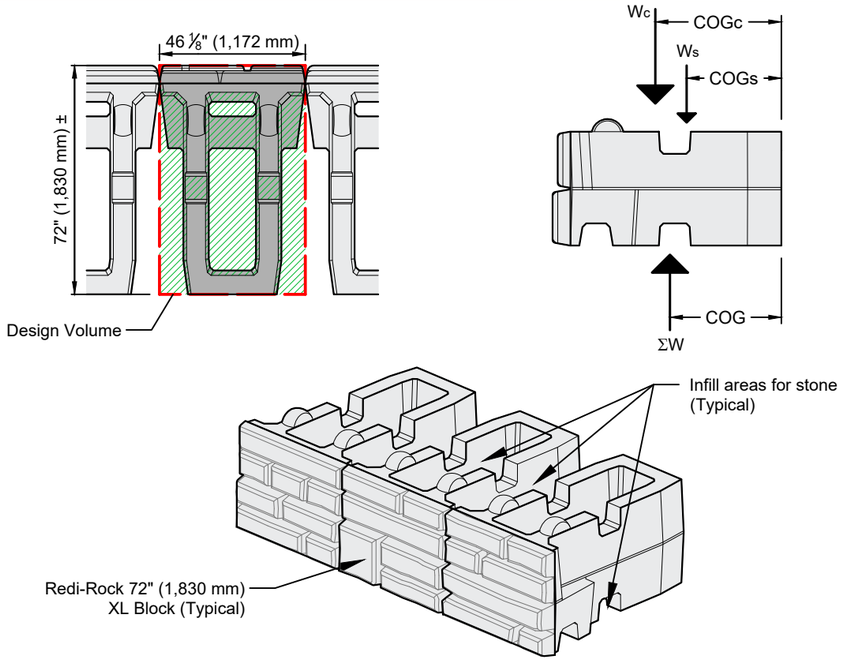
INFILLED UNIT WEIGHT

LEDGESTONE FACE TEXTURE
γ_{INFILL} = (3,331 lb + 2,288 lb) / 49.97 cft = **112.4 pcf**
((1,511 kg + 1,038 kg) / 1.415 m^3 = 1,801 kg/m^3)

NOTE: The infilled unit weights shown here are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis. For overturning analyses, AASHTO recommends limiting the infill soil weight to 80% of its theoretical maximum for units without a solid bottom (11.11.4.4).

Infill Weight Calculations

R-7236HC 72" (1,830 mm) XL HOLLOW-CORE RETAINING BLOCK WITH SOIL INFILL



INFILLED UNIT WEIGHT CALCULATIONS

CONCRETE

Design Unit Weight = 143 pcf (2,291 kg/m^3)

LEDGESTONE FACE TEXTURE

Average Volume (Vc)	29.10 cft (0.82 m^3) (From CAD Model)
Concrete Block Weight (Wc)	29.10 cft x 143 pcf = 4,162 lbs (1,888 kg)
Average Center of Gravity (COGc)	39.9 in (1,013 mm) (From CAD Model)

INFILL

Design Unit Weight = 100 pcf (1,602 kg/m^3)

Material considered as infill includes the crushed stone between adjacent blocks and in the hollow cores within the blocks.

Volume (Vs)	36.29 cft (1.03 m^3) (From CAD Model)
Infill Soil Weight (Ws)	36.29 cft x 100 pcf = 3,629 lbs (1,646 kg)
Center of Gravity (COGs)	30.0 in (762 mm) (From CAD Model)

DESIGN VOLUME & CENTER OF GRAVITY

72 in x 46.125 in x 36 in = 69.19 cft

(1.829 m x 1.172 m x 0.914 m = 1.959 m^3)

COG = (39.9 in (4,162 lbs) + 30.0 in (3,629 lbs))/(4,162 lbs + 3,629 lbs) = 35.26 in (896 mm)

INFILLED UNIT WEIGHT

LEDGESTONE FACE TEXTURE

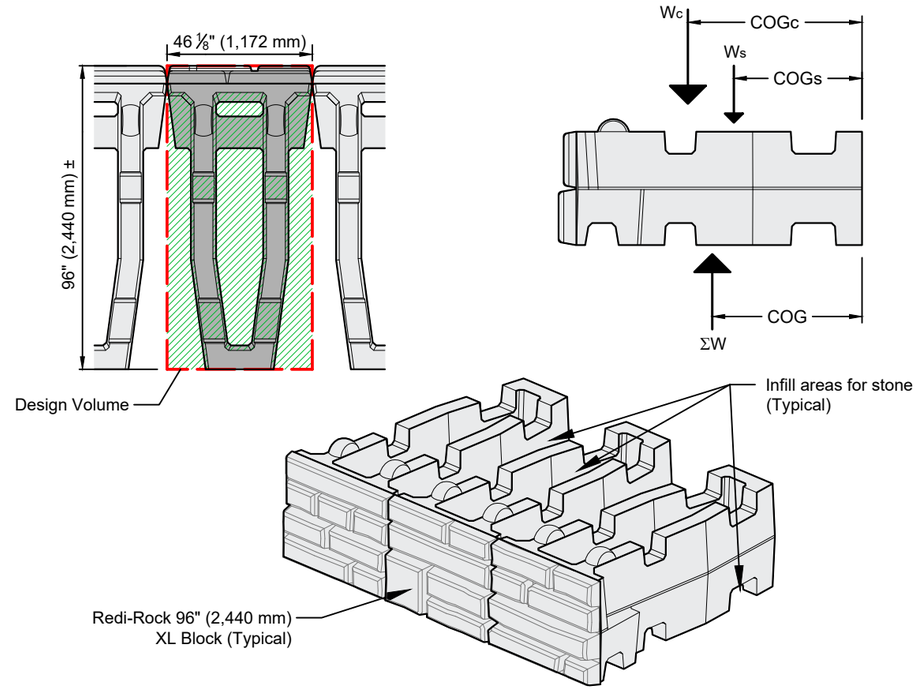
γ_{INFILL} = (4,162 lb + 3,629 lb) / 69.19 cft = **112.6 pcf**

((1,888 kg + 1,646 kg) / 1.959 m^3 = 1,804 kg/m^3)

NOTE: The infilled unit weights shown here are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis. For overturning analyses, AASHTO recommends limiting the infill soil weight to 80% of its theoretical maximum for units without a solid bottom (11.11.4.4).

Infill Weight Calculations

R-9636HC 96" (2,440 mm) XL HOLLOW-CORE RETAINING BLOCK WITH SOIL INFILL



INFILLED UNIT WEIGHT CALCULATIONS

CONCRETE

Design Unit Weight = 143 pcf (2,291 kg/m^3)

LEDGESTONE FACE TEXTURE

Average Volume (Vc)	33.83 cft (0.96 m^3) (From CAD Model)
Concrete Block Weight (Wc)	33.83 cft x 143 pcf = 4,837 lbs (2,194 kg)
Average Center of Gravity (COGc)	55.3 in (1,405 mm) (From CAD Model)

INFILL

Design Unit Weight = 100 pcf (1,602 kg/m^3)

Material considered as infill includes the crushed stone between adjacent blocks and in the hollow cores within the blocks.

Volume (Vs)	54.63 cft (1.55 m^3) (From CAD Model)
Infill Soil Weight (Ws)	54.63 cft x 100 pcf = 5,463 lbs (2,478 kg)
Center of Gravity (COGs)	40.7 in (1,034 mm) (From CAD Model)

DESIGN VOLUME

96 in x 46.125 in x 36 in = 92.25 cft

(2.438 m x 1.172 m x 0.914 m = 2.612 m^3)

COG = (55.3 in (4,837 lbs) + 40.7 in (5,463 lbs)) / (4,837 lbs + 5,463 lbs) = 47.57 in (1,208 mm)

INFILLED UNIT WEIGHT

LEDGESTONE FACE TEXTURE

γ_{INFILL} = (4,837 lb + 5,463 lb) / 92.25 cft = **111.7 pcf**

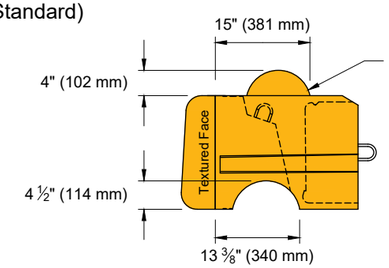
((2,194 kg + 2,478 kg) / 2.612 m^3 = 1,789 kg/m^3)

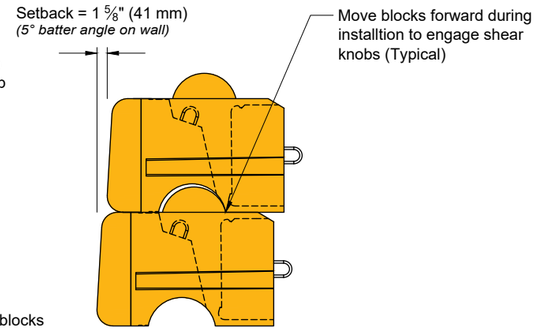
NOTE: The infilled unit weights shown here are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis. For overturning analyses, AASHTO recommends limiting the infill soil weight to 80% of its theoretical maximum for units without a solid bottom (11.11.4.4).

Block Setback Options

The block-to-block setback available with Redi-Rock is controlled by the size and location of the shear knobs (domes) cast into the blocks. While the 10" (254 mm) diameter knob and the 1 5/8" (41 mm) setback position is the most common configuration, Redi-Rock has three different knob sizes and three different locations available.

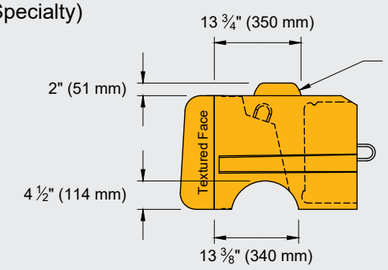
Five degree (5°) setback
(Standard)

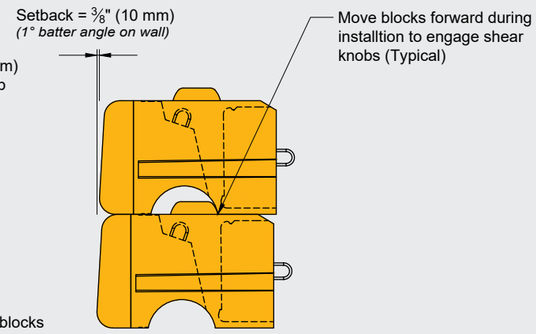




Available with:
- 28" (710 mm) blocks, 41" (1030 mm) blocks, and 60" (1520 mm) blocks
- 28" (710 mm) PC blocks (shown here) and 41" (1030 mm) PC blocks

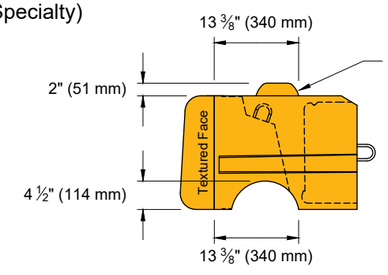
One degree (1°) setback
(Specialty)

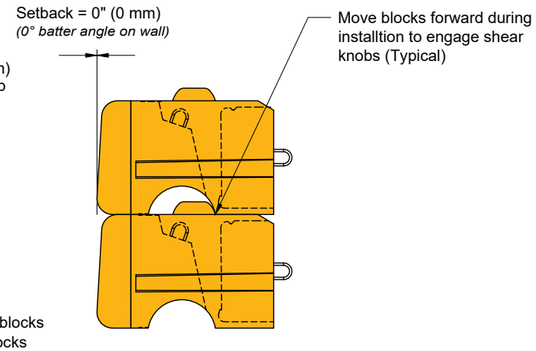




Available with:
- 28" (710 mm) blocks, 41" (1030 mm) blocks, and 60" (1520 mm) blocks
- 28" (710 mm) PC blocks (shown here) and 41" (1030 mm) PC blocks

Zero (0°) setback
(Specialty)





Available with:
- 28" (710 mm) blocks, 41" (1030 mm) blocks, and 60" (1520 mm) blocks
- 28" (710 mm) PC blocks (shown here) and 41" (1030 mm) PC blocks

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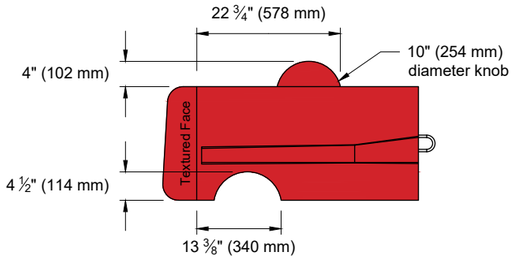
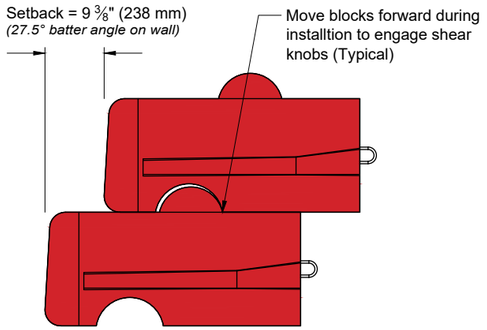
Block Setback Options

Redi-Rock has two options for large batter retaining walls. Both options are created by relocating the knob so that it is further back in the Redi-Rock blocks compared to our smaller batter walls (5° and less). There are two knob locations further back in the block which create the 9" (230 mm) setback block and the planter block. Blocks made with knobs in either of these locations almost exclusively use 10" (254 mm) diameter knobs.

9" (230 mm) Setback Blocks

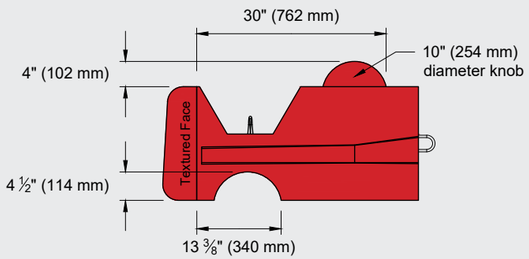


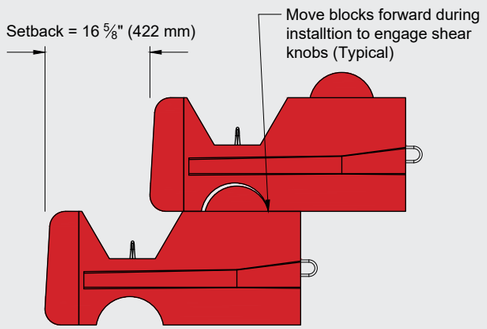


Available with:

- 41" (1030 mm) blocks (shown here) and 60" (1520 mm) blocks
- Not available in PC blocks

Planter Blocks





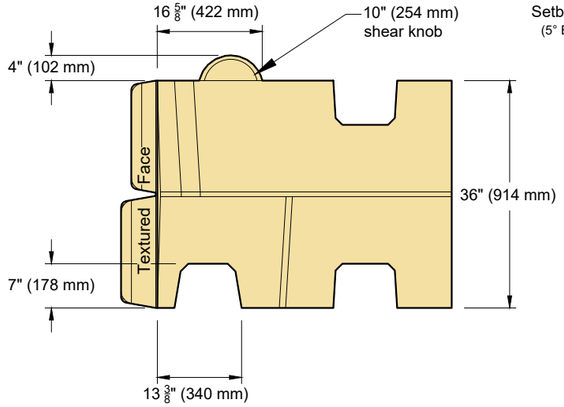
Available with:

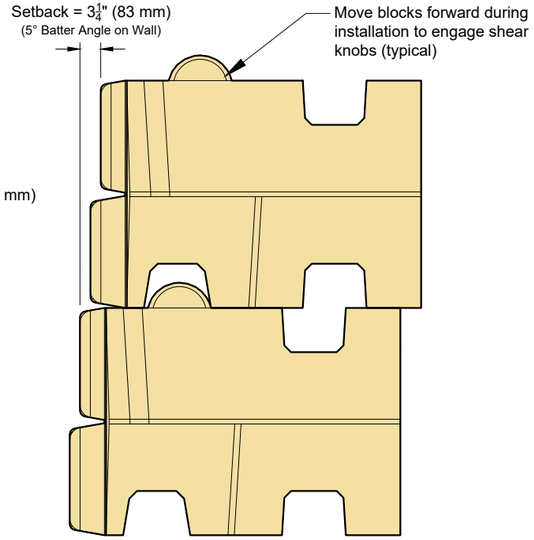
- 41" (1030 mm) blocks (shown here) and 60" (1520 mm) blocks
- Not available in PC blocks

Block Setback

The block-to-block setback available with 36" (914 mm) high Redi-Rock XL hollow-core retaining blocks is controlled by the location of the shear knobs cast into the blocks. The 3 1/4" (83 mm) setback between courses creates a 5° batter angle on the back of the wall which is consistent with the batter angle created by 18" (457 mm) high Redi-Rock blocks with 10" (254 mm) shear knobs.

36" (914 mm) High XL Hollow-Core Retaining Blocks





The relative knob and groove configuration, and resulting setback, are consistent between the 52" (1320 mm), 72" (1830 mm), and 96" (2440 mm) XL hollow-core retaining blocks.

Interface Shear Report 6.75” (171 mm)

Test Methods: ASTM D6916 & NCMA SRWU-2

Test Facility: Bathurst, Clarabut Geotechnical Testing, Inc.

Block Type: 28” (710 mm) Positive Connection (PC) Block

Test Dates: 10/21/2011 - 6.75” (171 mm) Shear Knob Test

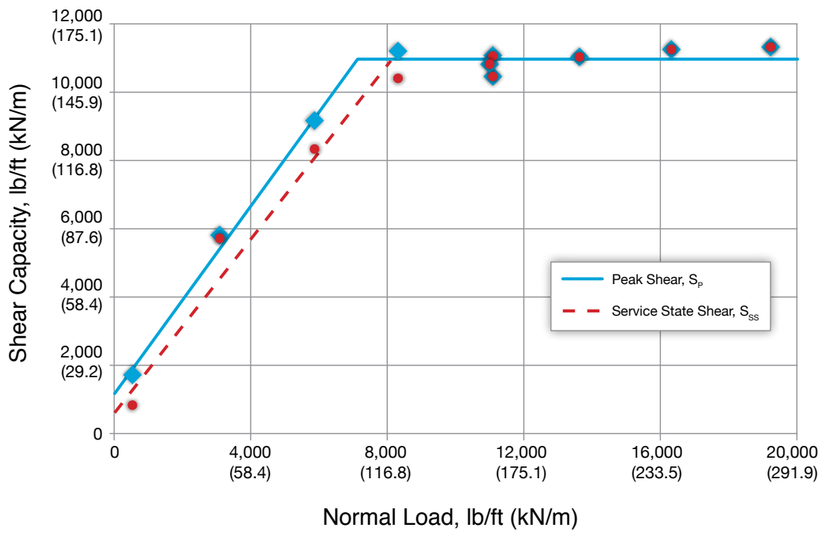
6.75” (171 mm) KNOB INTERFACE SHEAR DATA[a]

Test No.	Normal Load lb/ft	Normal Load (kN/m)	Service State Shear[b] lb/ft	Service State Shear[b] (kN/m)	Peak Shear lb/ft	Peak Shear (kN/m)	Observed Failure[c]
1	522	(7.618)	838	(12.230)	1,724	(25.160)	Test Stopped
2	19,209	(280.334)	11,324	(165.261)	11,324	(165.261)	Test Stopped
3	16,303	(237.924)	11,252	(164.211)	11,252	(164.211)	Test Stopped
4	13,612	(198.652)	11,036	(161.058)	11,036	(161.058)	Test Stopped
5	11,075	(161.627)	10,462	(152.681)	10,462	(152.681)	Test Stopped
6	11,074	(161.613)	11,060	(161.409)	11,252	(164.211)	Knob Shear
7	8,299	(121.115)	10,408	(151.893)	11,204	(163.510)	Test Stopped
8	5,854	(85.433)	8,337	(121.669)	9,935	(144.990)	Knob Shear
9	3,077	(44.905)	5,722	(83.506)	6,153	(89.796)	Knob Shear
10	10,981	(160.256)	10,821	(157.921)	11,252	(164.211)	Knob Shear

Peak Shear[d]: S_p = 1,178 + N tan 54° ≤ 10,970 lb/ft (S_p = 17.19 + N tan 54° ≤ 160.1 kN/m)

Service State Shear [d]: S_{ss} = 616 + N tan 52° ≤ 10,970 lb/ft (S_{ss} = 8.99 + N tan 52° ≤ 160.1 kN/m)

6.75” (171 mm) KNOB INTERFACE SHEAR CAPACITY



(a) The 28-day compressive strength of all concrete blocks tested in the 10-inch (254-millimeter) knob interface shear test series was 4,474 psi.

(b) Service State Shear is measured at a horizontal displacement equal to 2% of the block height. For Redi-Rock blocks, displacement = 0.36 inches (9.144 millimeters).

(c) In most cases, the test was stopped before block rupture or knob shear occurred to prevent damage to the test apparatus.

(d) Design shear capacity inferred from the test data reported herein should be lowered when test failure results from block rupture or knob shear if the compressive strength of the blocks used in design is less than the blocks used in this test. The data reported represents the actual laboratory test results. The equations for peak and service state shear conditions have been modified to reflect the interface shear performance of concrete with a minimum 28-day compressive strength equal to 4,000 psi. No further adjustments have been made. Appropriate factors of safety for design should be added.

The information contained in this report has been compiled by Redi-Rock International, LLC as a recommendation of peak interface shear capacity. It is accurate to the best of our knowledge as of the date of its issue. However, final determination of the suitability of any design information and the appropriateness of this data for a given design purpose is the sole responsibility of the user. No warranty of performance is expressed or implied by the publishing of the foregoing laboratory test results. Issue date: January 26, 2015.

Interface Shear Report 10” (254 mm)

Test Methods: ASTM D6916 & NCMA SRWU-2

Test Facility: Bathurst, Clarabut Geotechnical Testing, Inc.

Block Type: 28” (710 mm) Positive Connection (PC) Block

10/14/2011 - 10” (254 mm) Shear Knob Test

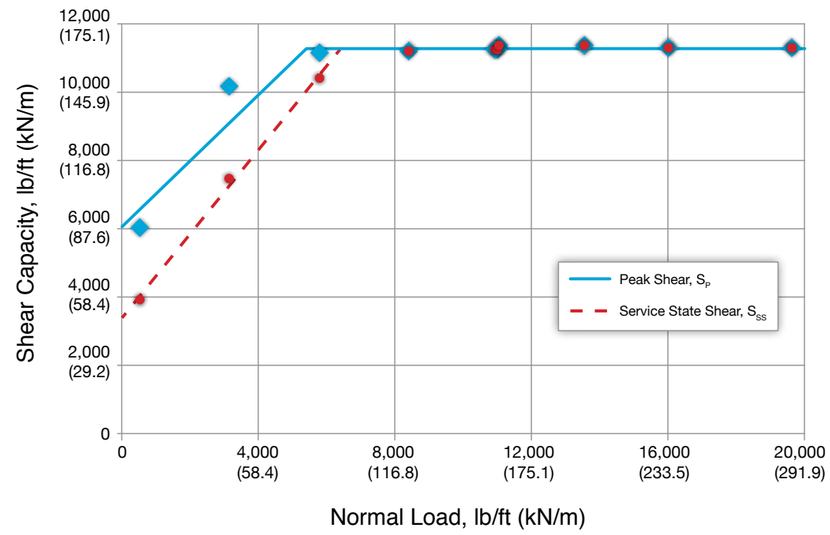
10" (254 mm) KNOB INTERFACE SHEAR DATA[a]

Test No.	Normal Load lb/ft	Normal Load (kN/m)	Service State Shear[b] lb/ft	Service State Shear[b] (kN/m)	Peak Shear lb/ft	Peak Shear (kN/m)	Observed Failure[c]
1	19,619	(286.318)	11,300	(164.911)	11,300	(164.911)	Test Stopped
2	16,007	(233.605)	11,300	(164.911)	11,300	(164.911)	Test Stopped
3	13,546	(197.689)	11,371	(165.947)	11,371	(165.947)	Test Stopped
4	11,042	(161.146)	11,371	(165.947)	11,371	(165.947)	Test Stopped
5	8,400	(122.589)	11,204	(163.510)	11,204	(163.510)	Test Stopped
6	10,999	(160.518)	11,252	(164.211)	11,252	(164.211)	Test Stopped
7	10,922	(159.395)	11,252	(164.211)	11,252	(164.211)	Test Stopped
8	5,786	(84.440)	10,414	(151.981)	11,156	(162.810)	Test Stopped
9	3,137	(45.781)	7,469	(109.002)	10,174	(148.478)	Test Stopped
10	522	(7.618)	3,926	(57.296)	6,033	(88.045)	Test Stopped

Peak Shear: S_p = 6,061 + N tan 44° ≤ 11,276 lb/ft (S_p = 88.45 + N tan 44° ≤ 164.56 kN/m)

Service State Shear: S_{ss} = 3,390 + N tan 51° ≤ 11,276 lb/ft (S_{ss} = 49.47 + N tan 51° ≤ 164.56 kN/m)

10” (254 mm) KNOB INTERFACE SHEAR CAPACITY



(a) The 28-day compressive strength of all concrete blocks tested in the 10-inch (254-millimeter) knob interface shear test series was 4,474 psi.

(b) Service State Shear is measured at a horizontal displacement equal to 2% of the block height. For Redi-Rock blocks, displacement = 0.36 inches (9.144 millimeters).

(c) In most cases, the test was stopped before block rupture or knob shear occurred to prevent damage to the test apparatus.

(d) Design shear capacity inferred from the test data reported herein should be lowered when test failure results from block rupture or knob shear if the compressive strength of the blocks used in design is less than the blocks used in this test. The data reported represents the actual laboratory test results. The equations for peak and service state shear conditions have been modified to reflect the interface shear performance of concrete with a minimum 28-day compressive strength equal to 4,000 psi. No further adjustments have been made. Appropriate factors of safety for design should be added.

The information contained in this report has been compiled by Redi-Rock International, LLC as a recommendation of peak interface shear capacity. It is accurate to the best of our knowledge as of the date of its issue. However, final determination of the suitability of any design information and the appropriateness of this data for a given design purpose is the sole responsibility of the user. No warranty of performance is expressed or implied by the publishing of the foregoing laboratory test results. Issue date: January 26, 2015.

Project: Presbyterian West Side Project ***Owner:*** Presbyterian Hospital ***Wall Engineer:*** Don Maccornack ***Project Design Engineer:*** Bohannan Huston ***Architect:*** Dekker Perich Sabatini ***Installer:*** Sall's Brothers ***Manufacturer:*** Materials Inc./Buildology ***Location:*** Albuquerque, New Mexico ***Completed:*** 2010

Interface Shear Report XL Hollow-Core Retaining Block

Test Methods: ASTM D6916 & NCMA SRWU-2

Block Type: R-5236 52" Hollow-Core Retaining Block

INTERFACE SHEAR DATA[a]

Tested By: TRI Environmental | Dec. 10-21, 2017

Test No.	Normal Load lb/ft	Normal Load (kN/m)	Peak Shear lb/ft	Peak Shear (kN/m)	Observed Failure[c]
1	872	(12.719)	3,812	(55.630)	Test stopped - uplift
2	5,026	(73.350)	11,503	(167.877)	Knob/face shear
3	872	(12.719)	3,383	(49.376)	Test stopped - uplift
4	16,562	(241.704)	16,962	(247.537)	Test stopped - capacity
5	2,062	(30.098)	6,970	(101.714)	Test stopped - uplift
6	3,539	(51.642)	9,857	(143.848)	Test stopped - uplift
7	7,773	(113.442)	11,210	(163.598)	Knob/face shear
8	7,765	(113.318)	10,601	(154.710)	Test stopped - back cracked
9	7,656	(111.733)	12,405	(181.044)	Test stopped - back cracked
10	6,541	(95.458)	12,112	(176.765)	Test stopped - uplift
11	12,496	(182.360)	13,962	(203.757)	Test stopped - back cracked

Tested By: Redi-Rock International | Mar. 14-23, 2018

Test No.	Normal Load lb/ft	Normal Load (kN/m)	Peak Shear lb/ft	Peak Shear (kN/m)	Observed Failure[c]
1	7,759	(113.240)	15,635	(228.179)	Test stopped - back cracked
2	7,840	(114.409)	15,843	(231.213)	Test stopped - back cracked
3	7,761	(113.270)	13,859	(202.255)	Knob/face shear
4	16,617	(242.509)	17,070	(249.119)	Test stopped - back cracked
5	12,588	(183.705)	17,305	(252.543)	Knob/face shear
6	842	(12.294)	6,643	(96.951)	Knob/face shear
7	858	(12.522)	6,708	(97.900)	Knob/face shear
8	2,324	(33.910)	9,102	(132.827)	Test stopped - back cracked
9	3,609	(52.666)	11,747	(171.436)	Test stopped - back cracked
10	5,060	(73.848)	10,943	(159.697)	Test stopped - back cracked
11	6,612	(96.489)	12,978	(189.395)	Test stopped - back cracked

Peak Shear Envelope:[c]

$S_{p(1)} = 4547 + N \tan 44°$ (N < 7,017 lb/ft)

$S_{p(2)} = 8488 + N \tan 22°$ (7017 lb/ft ≤ N < 16,118 lb/ft)

$S_{p(max)} = 15{,}000$ lb/ft (N ≥ 16,118 lb/ft)

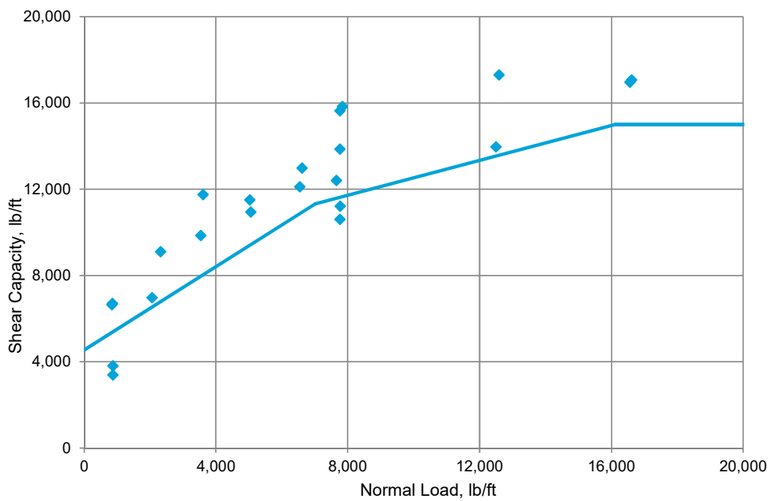
Inflection Points:

$N_1 = 0$ lb/ft $S_1 = 4547$ lb/ft

$N_2 = 7017$ lb/ft $S_2 = 11{,}323$ lb/ft

$N_3 = 16{,}118$ lb/ft $S_3 = 15{,}000$ lb/ft

INTERFACE SHEAR CAPACITY



(a) The average compressive strength at the time of testing of all concrete blocks tested in the XL hollow- core retaining block test series was 5,350 psi.

(b) In many cases, the test was stopped before peak shear load occured because of significant uplift of upper block, damage to the back of upper block where horizontal load was applied, or maximum capacity of test apparatus was reached.

(c) Design shear capacity inferred from the test data reported herein should be lowered when test failure results from block rupture or knob shear if the compressive strength of the blocks used in design is less than the blocks used in this test. The data reported represents the actual laboratory test results. The equations for peak shear conditions have been modified to reflect the interface shear performance of concrete with a minimum 28-day compressive strength equal to 4,000 psi. No further adjustments have been made. Appropriate factors of safety for design should be added.

The information contained in this report has been compiled by Redi-Rock International, LLC as a recommendation of peak interface shear capacity. It is accurate to the best of our knowledge as of the date of its issue. However, final determination of the suitability of any design information and the appropriateness of this data for a given design purpose is the sole responsibility of the user. No warranty of performance is expressed or implied by the publishing of the foregoing laboratory test results.

Geogrid Connection Design Parameters—Miragrid 5XT

Test Methods: ASTM D6638 & NCMA SRWU-1

Test Facility: Bathurst, Clarabut Geotechnical Testing, Inc.

Geogrid Type: Miragrid 5XT

Test Date: February 17, 2011

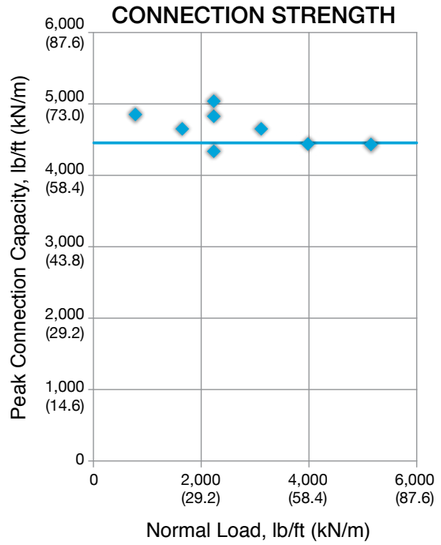
Block Type: Positive Connection (PC) Block

CONNECTION STRENGTH TEST DATA[a]

Test No.	Normal Load lb/ft	Normal Load (kN/m)	Peak Connection lb/ft	Peak Connection (kN/m)	Observed Failure
1	2,236	(32.6)	5,040	(73.6)	Grid Rupture
2	775	(11.3)	4,860	(70.9)	Grid Rupture
3	5,165	(75.4)	4,444	(64.9)	Grid Rupture
4	2,242	(32.7)	4,343	(63.4)	Grid Rupture
5	1,649	(24.1)	4,658	(68.0)	Grid Rupture
6	3,123	(45.6)	4,680	(68.3)	Grid Rupture
7	2,236	(32.6)	4,838	(70.6)	Grid Rupture
8	3,991	(58.2)	4,444	(64.9)	Grid Rupture

Peak Connection$_{(average)}$= 4,663 lb/ft (68.1 kN/m)

Peak Connection$_{(95\% \text{ confidence level})}$[b]= 4,460 lb/ft (65.1 kN/m)



CONNECTION DESIGN DATA

for use with AASHTO LRFD Bridge Design Specifications, 6th Edition (2012)

Miragrid 5XT Ultimate Tensile Strength (MARV) T_{ult} = 4,700 lb/ft (68.1 kN/m)

Ultimate Connection Strength $T_{ultconn}$ = 4,460 lb/ft (65.1 kN/m)

Ultimate Tensile Strength of Geosynthetic Test Sample T_{lot} = 5,334 lb/ft (77.8 kN/m)

Connection Strength / Sample Strength $T_{ultconn}$ / T_{lot} = 0.84

Short-term Ultimate Connection Strength Reduction Factor[c] CR_u = 0.84

Creep Reduction Factor

- 75-Year Design $RF_{cr(75)}$ = 1.56
- 100-Year Design $RF_{cr(100)}$ = 1.58

Durability Reduction Factor[d] RF_D = 1.15

Long-term Connection Strength Reduction Factor

- 75-Year Design $CR_{cr(75)}$ = 0.54
- 100-Year Design $CR_{cr(100)}$ = 0.53

Nominal Long-term Geosynthetic Connection Strength

- 75-Year Design $T_{ac(75)}$ = 2,201 lb/ft (32.1 kN/m)
- 100-Year Design $T_{ac(100)}$ = 2,173 lb/ft (31.7 kN/m)

(a) Tested with 3/4 inch (19 mm) clean crushed stone lightly compacted in the vertical core slot in accordance with Redi-Rock International's typical installation recommendations.

(b) Because the geogrid connection is not normal-load dependent and an expression of peak connection for use in design cannot be reliably determined through linear regression, the peak connection results are analyzed as continuous random variables. The average value or sample mean is reported for the test sample as well as a reduction based upon a 95% confidence interval calculated from the Student's t-test for n-1 degrees of freedom.

(c) Recommended CR_u for design is based on a statistical best-fit analysis of $T_{ultconn}$ / T_{lot} values across all geogrid types tested.

(d) Recommended value for 5 < pH < 8. RF_D value of 1.3 recommended for 4.5 ≤ pH ≤ 5 and 8 ≤ pH ≤ 9.

Geogrid Connection Design Parameters—Miragrid 8XT

Test Methods: ASTM D6638 & NCMA SRWU-1

Test Facility: Bathurst, Clarabut Geotechnical Testing, Inc.

Geogrid Type: Miragrid 8XT

Test Date: December 16, 2011

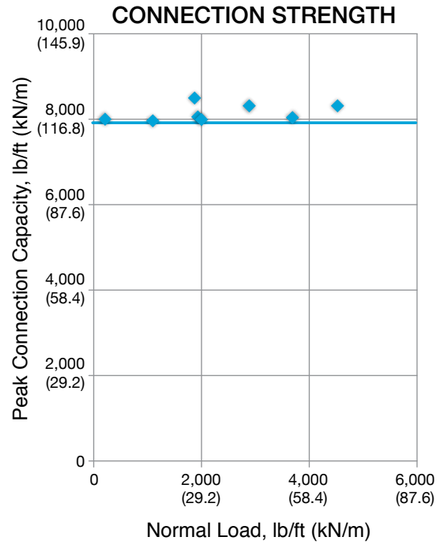
Block Type: Positive Connection (PC) Block

CONNECTION STRENGTH TEST DATA[a]

Test No.	Normal Load lb/ft	Normal Load (kN/m)	Peak Connection lb/ft	Peak Connection (kN/m)	Observed Failure
1	1,960	(28.6)	7,995	(116.7)	Grid Rupture
2	241	(3.5)	7,949	(116.0)	Grid Rupture
3	1,125	(16.4)	7,904	(115.4)	Grid Rupture
4	2,036	(29.7)	7,949	(116.0)	Grid Rupture
5	2,914	(42.5)	8,269	(120.7)	Grid Rupture
6	3,715	(54.2)	7,995	(116.7)	Grid Rupture
7	1,900	(27.7)	8,452	(123.3)	Grid Rupture
8	4,551	(66.4)	8,269	(120.7)	Grid Rupture

Peak Connection$_{(average)}$= 8,098 lb/ft (118.2 kN/m)

Peak Connection$_{(95\% \text{ confidence level})}$[b]= 7,928 lb/ft (115.7 kN/m)



CONNECTION DESIGN DATA

for use with AASHTO LRFD Bridge Design Specifications, 6th Edition (2012)

Miragrid 8XT Ultimate Tensile Strength (MARV) T_{ult} = 7,400 lb/ft (108.0 kN/m)

Ultimate Connection Strength $T_{ultconn}$ = 7,928 lb/ft (115.7 kN/m)

Ultimate Tensile Strength of Geosynthetic Test Sample T_{lot} = 8,055 lb/ft (117.6 kN/m)

Connection Strength / Sample Strength $T_{ultconn}$ / T_{lot} = 0.98

Short-term Ultimate Connection Strength Reduction Factor [c] CR_u = 0.84

Creep Reduction Factor

- 75-Year Design $RF_{cr(75)}$ = 1.56
- 100-Year Design $RF_{cr(100)}$ = 1.58

Durability Reduction Factor [d] RF_D = 1.15

Long-term Connection Strength Reduction Factor

- 75-Year Design $CR_{cr(75)}$ = 0.54
- 100-Year Design $CR_{cr(100)}$ = 0.53

Nominal Long-term Geosynthetic Connection Strength

- 75-Year Design $T_{ac(75)}$ = 3,465 lb/ft (50.6 kN/m)
- 100-Year Design $T_{ac(100)}$ = 3,421 lb/ft (49.9 kN/m)

(a) Tested with 3/4 inch (19 mm) clean crushed stone lightly compacted in the vertical core slot in accordance with Redi-Rock International's typical installation recommendations.

(b) Because the geogrid connection is not normal-load dependent and an expression of peak connection for use in design cannot be reliably determined through linear regression, the peak connection results are analyzed as continuous random variables. The average value or sample mean is reported for the test sample as well as a reduction based upon a 95% confidence interval calculated from the Student's t-test for n-1 degrees of freedom.

(c) Recommended CR_u for design is based on a statistical best-fit analysis of $T_{ultconn}$ / T_{lot} values across all geogrid types tested.

(d) Recommended value for 5 < pH < 8. RF_D value of 1.3 recommended for 4.5 ≤ pH ≤ 5 and 8 ≤ pH ≤ 9.

Geogrid Connection Design Parameters—Miragrid 10XT

Test Methods: ASTM D6638 & NCMA SRWU-1 | Test Facility: Bathurst, Clarabut Geotechnical Testing, Inc.

Geogrid Type: Miragrid 10XT | Test Date: November 28, 2011

Block Type: Positive Connection (PC) Block

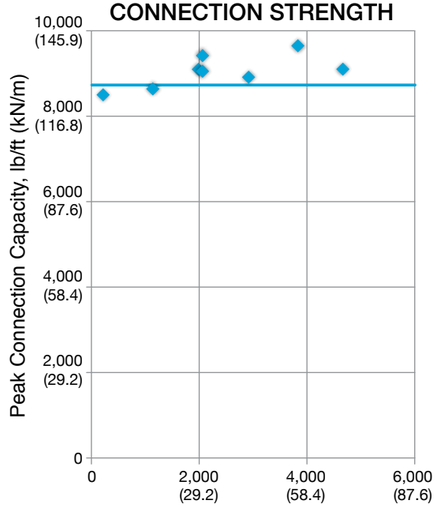
CONNECTION STRENGTH TEST DATA[a]

Test No.	Normal Load lb/ft	Normal Load (kN/m)	Peak Connection lb/ft	Peak Connection (kN/m)	Observed Failure
1	1,990	(29.0)	9,046	(132.0)	Grid Rupture
2	228	(3.3)	8,452	(123.3)	Grid Rupture
3	1,147	(16.7)	8,589	(125.3)	Grid Rupture
4	2,067	(30.2)	9,365	(136.7)	Grid Rupture
5	2,918	(42.6)	8,863	(129.3)	Grid Rupture
6	3,830	(55.9)	9,594	(140.0)	Grid Rupture
7	2,067	(30.2)	9,000	(131.3)	Grid Rupture
8	4707	(68.7)	9,046	(132.0)	Grid Rupture

Peak Connection$_{(average)}$ = 8,994 lb/ft (131.3 kN/m)

Peak Connection$_{(95\% \text{ confidence level})}$[b] = 8,681 lb/ft (126.7 kN/m)

CONNECTION STRENGTH



CONNECTION DESIGN DATA

for use with AASHTO LRFD Bridge Design Specifications, 6th Edition (2012)

Miragrid 10XT Ultimate Tensile Strength (MARV) T_{ult} = 9,500 lb/ft (138.6 kN/m)
Ultimate Connection Strength $T_{ultconn}$ = 8,681 lb/ft (126.7 kN/m)
Ultimate Tensile Strength of Geosynthetic Test Sample T_{lot} = 10,635 lb/ft (155.2 kN/m)
Connection Strength / Sample Strength $T_{ultconn}$ / T_{lot} = 0.82
Short-term Ultimate Connection Strength Reduction Factor[c] CR_u = 0.82
Creep Reduction Factor
75-Year Design $RF_{cr(75)}$ = 1.56
100-Year Design $RF_{cr(100)}$ = 1.58
Durability Reduction Factor[d] RF_D = 1.15
Long-term Connection Strength Reduction Factor
75-Year Design $CR_{cr(75)}$ = 0.53
100-Year Design $CR_{cr(100)}$ = 0.52
Nominal Long-term Geosynthetic Connection Strength
75-Year Design $T_{ac(75)}$ = 4,342 lb/ft (63.4 kN/m)
100-Year Design $T_{ac(100)}$ = 4,287 lb/ft (62.6 kN/m)

(a) Tested with 3/4 inch (19 mm) clean crushed stone lightly compacted in the vertical core slot in accordance with Redi-Rock International's typical installation recommendations.

(b) Because the geogrid connection is not normal-load dependent and an expression of peak connection for use in design cannot be reliably determined through linear regression, the peak connection results are analyzed as continuous random variables. The average value or sample mean is reported for the test sample as well as a reduction based upon a 95% confidence interval calculated from the Student's t-test for n-1 degrees of freedom.

(c) Recommended CR_u for design is based on a statistical best-fit analysis of $T_{ultconn}$ / T_{lot} values across all geogrid types tested.

(d) Recommended value for 5 < pH < 8. RF_D value of 1.3 recommended for 4.5 ≤ pH ≤ 5 and 8 ≤ pH ≤ 9.

Geogrid Connection Design Parameters—Miragrid 20XT

Test Methods: ASTM D6638 & NCMA SRWU-1 | Test Facility: Bathurst, Clarabut Geotechnical Testing, Inc.

Geogrid Type: Miragrid 20XT | Test Date: December 16, 2011

Block Type: Positive Connection (PC) Block

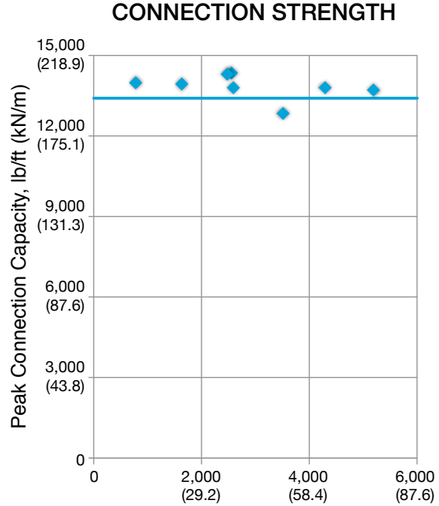
CONNECTION STRENGTH TEST DATA[a]

Test No.	Normal Load lb/ft	Normal Load (kN/m)	Peak Connection lb/ft	Peak Connection (kN/m)	Observed Failure
1	2,608	(38.1)	13,797	(201.4)	Grid Rupture
2	802	(11.7)	13,980	(204.0)	Grid Rupture
3	1,654	(24.1)	13,934	(203.4)	Grid Rupture
4	2,521	(36.8)	14,299	(208.7)	Grid Rupture
5	3,527	(51.5)	12,837	(187.3)	Grid Rupture
6	4,302	(62.8)	13,797	(201.4)	Grid Rupture
7	2,573	(37.6)	14,345	(209.3)	Grid Rupture
8	5,196	(75.8)	13,706	(200.0)	Grid Rupture

Peak Connection$_{(average)}$ = 13,837 lb/ft (201.9 kN/m)

Peak Connection$_{(95\% \text{ confidence level})}$[b] = 13,447 lb/ft (196.2 kN/m)

CONNECTION STRENGTH



CONNECTION DESIGN DATA

for use with AASHTO LRFD Bridge Design Specifications, 6th Edition (2012)

Miragrid 20XT Ultimate Tensile Strength (MARV) T_{ult} = 13,705 lb/ft (200.0 kN/m)
Ultimate Connection Strength $T_{ultconn}$ = 13,447 lb/ft (196.2 kN/m)
Ultimate Tensile Strength of Geosynthetic Test Sample T_{lot} = 16,397 lb/ft (239.3 kN/m)
Connection Strength / Sample Strength $T_{ultconn}$ / T_{lot} = 0.82
Short-term Ultimate Connection Strength Reduction Factor[c] CR_u = 0.80
Creep Reduction Factor
75-Year Design $RF_{cr(75)}$ = 1.56
100-Year Design $RF_{cr(100)}$ = 1.58
Durability Reduction Factor[d] RF_D = 1.15
Long-term Connection Strength Reduction Factor
75-Year Design $CR_{cr(75)}$ = 0.51
100-Year Design $CR_{cr(100)}$ = 0.51
Nominal Long-term Geosynthetic Connection Strength
75-Year Design $T_{ac(75)}$ = 6,111 lb/ft (89.2 kN/m)
100-Year Design $T_{ac(100)}$ = 6,034 lb/ft (88.1 kN/m)

(a) Tested with 3/4 inch (19 mm) clean crushed stone lightly compacted in the vertical core slot in accordance with Redi-Rock International's typical installation recommendations.

(b) Because the geogrid connection is not normal-load dependent and an expression of peak connection for use in design cannot be reliably determined through linear regression, the peak connection results are analyzed as continuous random variables. The average value or sample mean is reported for the test sample as well as a reduction based upon a 95% confidence interval calculated from the Student's t-test for n-1 degrees of freedom.

(c) Recommended CR_u for design is based on a statistical best-fit analysis of $T_{ultconn}$ / T_{lot} values across all geogrid types tested.

(d) Recommended value for 5 < pH < 8. RF_D value of 1.3 recommended for 4.5 ≤ pH ≤ 5 and 8 ≤ pH ≤ 9.

Geogrid Connection Design Parameters—Miragrid 24XT

Test Methods: ASTM D6638 & NCMA SRWU-1

Test Facility: Bathurst, Clarabut Geotechnical Testing, Inc.

Geogrid Type: Miragrid 24XT

Test Date: February 29, 2012

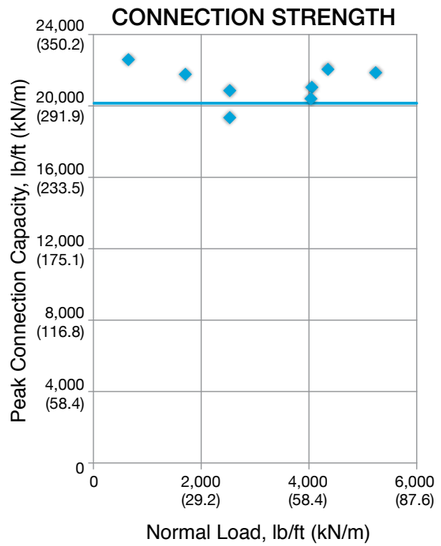
Block Type: Positive Connection (PC) Block

CONNECTION STRENGTH TEST DATA[a]

Test No.	Normal Load lb/ft	Normal Load (kN/m)	Peak Connection lb/ft	Peak Connection (kN/m)	Observed Failure
1	4,046	(59.0)	20,375	(297.4)	Grid Rupture
2	4,362	(63.7)	22,020	(321.4)	Grid Rupture
3	665	(9.7)	22,568	(329.4)	Grid Rupture
4	2,538	(37.0)	20,832	(304.0)	Grid Rupture
5	1,713	(25.0)	21,746	(317.4)	Grid Rupture
6	5,248	(76.6)	21,837	(318.7)	Block & Grid
7	2,539	(37.1)	19,914	(290.6)	Grid Rupture
8	4,063	(59.3)	21,015	(306.7)	Block Rupture

Peak Connection$_{(average)}$ = 21,288 lb/ft (310.7 kN/m)

Peak Connection$_{(95\% \text{ confidence level})}$[b] = 20,535 lb/ft (299.7 kN/m)



CONNECTION DESIGN DATA

for use with AASHTO LRFD Bridge Design Specifications, 6th Edition (2012)

Miragrid 24XT Ultimate Tensile Strength (MARV) T_{ult} = 27,415 lb/ft (400.1 kN/m)
Ultimate Connection Strength $T_{ultconn}$ = 20,535 lb/ft (299.7 kN/m)
Ultimate Tensile Strength of Geosynthetic Test Sample T_{lot} = 29,130 lb/ft (425.1 kN/m)
Connection Strength / Sample Strength $T_{ultconn}$ / T_{lot} = 0.70
Short-term Ultimate Connection Strength Reduction Factor[c] CR_u = 0.70
Creep Reduction Factor
75-Year Design $RF_{cr(75)}$ = 1.56
100-Year Design $RF_{cr(100)}$ = 1.58
Durability Reduction Factor [d] RF_D = 1.15
Long-term Connection Strength Reduction Factor
75-Year Design $CR_{cr(75)}$ = 0.45
100-Year Design $CR_{cr(100)}$ = 0.45
Nominal Long-term Geosynthetic Connection Strength
75-Year Design $T_{ac(75)}$ = 10,773 lb/ft (157.2 kN/m)
100-Year Design $T_{ac(100)}$ = 10,636 lb/ft (155.2 kN/m)

(a) Tested with 3/4 inch (19 mm) clean crushed stone lightly compacted in the vertical core slot in accordance with Redi-Rock International's typical installation recommendations.

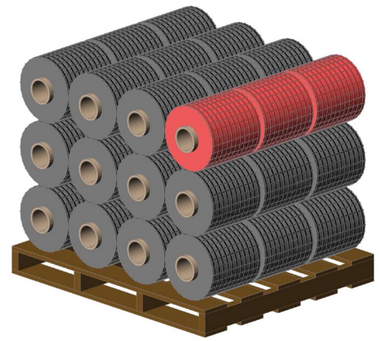
(b) Because the geogrid connection is not normal-load dependent and an expression of peak connection for use in design cannot be reliably determined through linear regression, the peak connection results are analyzed as continuous random variables. The average value or sample mean is reported for the test sample as well as a reduction based upon a 95% confidence interval calculated from the Student's t-test for n-1 degrees of freedom.

(c) Recommended CR_u for design is based on a statistical best-fit analysis of $T_{ultconn}$ / T_{lot} values across all geogrid types tested.

(d) Recommended value for 5 < pH < 8. RF_D value of 1.3 recommended for 4.5 ≤ pH ≤ 5 and 8 ≤ pH ≤ 9.

Geogrid Packaging, Ordering, and Delivery

Geogrid for Redi-Rock Positive Connection (PC) System retaining walls is provided in 12 inch (305 millimeter) wide strips in 200 feet (61 meters) long rolls. Geogrids approved for use are Mirafi XT manufactured by TenCate Geosynthetics of Pendergrass, Georgia, USA. The geogrid strips are factory cut to width and are certified for width and strength by TenCate Mirafi. **Other geogrid products or strips that are field cut to width from larger rolls are not allowed.**



The geogrid is packaged with 3 rolls on each cardboard tube. Total number of rolls that can be placed on a pallet varies with product type.

Geogrid	Rolls Per Pallet	Pallet Weight
5XT	60	743 lb (337 kg)
8XT	48	764 lb (346 kg)
10XT	48	958 lb (434 kg)
20 XT	27	503 lb (228 kg)
24XT	27	1,478 lb (670 kg)

Geogrid strips are available exclusively through the Redi-Rock network of independently-owned and -operated, licensed manufacturers. Contact information for the Redi-Rock manufacturer in your area is available at **redi-rock.com**.

Typically, the geogrid strips are ordered by the pallet. If your project doesn't require a full pallet of geogrid strips, smaller tube quantities may be available from your Redi-Rock manufacturer.

Additionally, custom roll lengths between 150 feet (45 meters) and 250 feet (76 meters) are available in quantities greater than 48 pallets of the same geogrid type. Plan ahead because a minimum 10 week lead time is required for custom lengths.

GEOGRID ESTIMATING

Geogrid estimating for a project is a simple process:

- Determine the cut length of strips for your different wall sections.
- Roll length / cut length = number of whole strips you can get from each roll of geogrid.
- Total number of required strips / number of strips per roll = total number of rolls you need to order.

The preliminary charts list an approximate length of geogrid for estimating purposes. The example below is for a 21 foot (6.4 meter) tall wall section in 30° soil with no surcharge loads or slopes:

Type	Rolls per linear foot	Rolls per linear meter
5XT	±0.26	±0.85
10XT	±0.30	±1.00

In this example, the geogrid required to build a 100 foot (30.5 meter) long section of wall (26 blocks long) is:

100 x 0.26 = 26 rolls of 5XT
100 x 0.30 = 30 rolls of 10XT

(This information is included with each cross section in the Preliminary Reinforcement Schedule in the MSE Wall section of the DRM.)

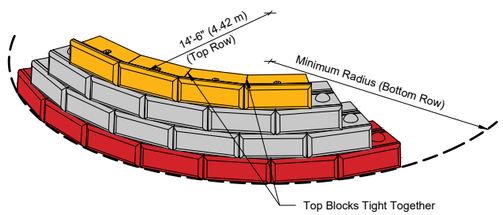
Minimum Turning Radius

Convex curves can easily be incorporated into a Redi-Rock wall. Redi-Rock blocks are tapered 7½° on each side. The smallest radius that can be made with Redi-Rock blocks (without cutting the blocks) occurs when the blocks are placed together with their sides touching. This minimum radius for full size blocks is 14 feet - 6 inches (4.42 m) from the face of the blocks.

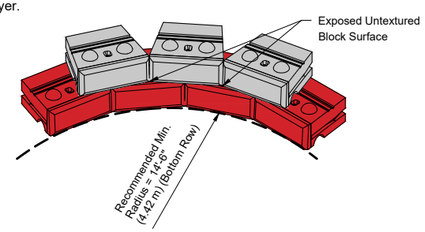
Block to block setback will cause the radius for each succeeding row to be smaller than the row below. To ensure the minimum radius for the top row of blocks in a wall, start with the minimum radius and then add 2” (51 mm) per course for each standard setback block 18-inch high block, 10” (254 mm) per course for each 9” (230 mm) setback block, and 17” (432 mm) per course for each planter block in the wall below the top row of blocks. For 36-inch high XL blocks, add 4” (101.6 mm) per row.

MINIMUM RADIUS FOR BOTTOM ROW OF BLOCKS

	18-INCH (457 mm) HIGH BLOCKS	36-INCH (914 mm) HIGH XL BLOCKS
Height of Wall	Radius From Face of Block	Radius From Face of Block
1’-6” (0.46 m)	14’-6” (4.42 m)	
3’-0” (0.91 m)	14’-8” (4.47 m)	
4’-6” (1.37 m)	14’-10” (4.52 m)	
6’-0” (1.83 m)	15’-0” (4.57 m)	15’-0” (4.57 m)
7’-6” (2.29 m)	15’-2” (4.62 m)	15’-2” (4.62 m)
9’-0” (2.74 m)	15’-4” (4.67 m)	15’-4” (4.67 m)
10’-6” (3.20 m)	15’-6” (4.72 m)	15’-6” (4.72 m)
12’-0” (3.66 m)	15’-8” (4.78 m)	15’-8” (4.78 m)
13’-6” (4.11 m)	15’-10” (4.83 m)	15’-10” (4.83 m)
15’-0” (4.57 m)	16’-0” (4.88 m)	16’-0” (4.88 m)
16’-6” (5.03 m)		16’-2” (*.** m)
18’-0” (5.49 m)		6’-4” (4.98 m)
19’-6” (5.94 m)		16’-6” (5.03 m)
21’-0” (6.4 m)		16’-8” (95.08 m)



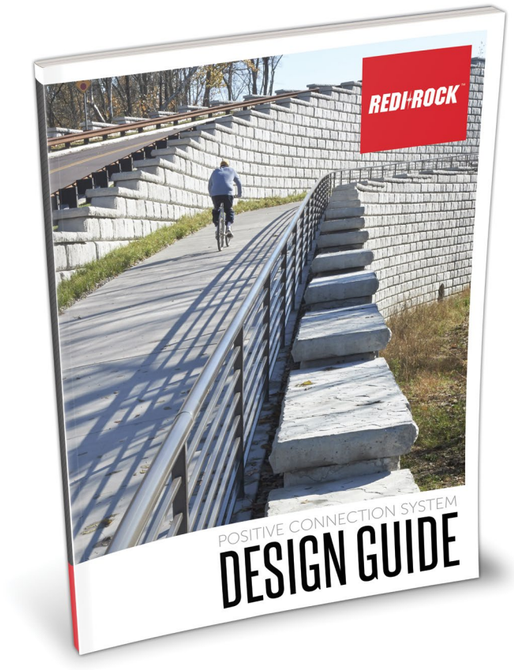
Concave curves may be installed at varying radii. The blocks should be placed tight together to make a smooth curve. Although there is no fixed minimum radius, smaller radii lengths of less than 14’6” (4.42 m) will result in exposing more of the untextured top face of the blocks in the underlying layer.



Project: Pigeon Forge Park ***Customer:*** City of Pigeon Forge, Tennessee ***Block Manufacturer:*** Blalock Ready Mix ***Location:*** Pigeon Forge, Tennessee ***Completed:*** 2013

Positive Connection (PC) Design Guide

Redi-Rock publishes a great resource created especially for engineers who are considering, designing, or reviewing a mechanically stabilized earth wall utilizing the Redi-Rock PC System. Inside the PC System Design Guide you will find an overview of the system, sample projects, components, MSEW inputs, and an example problem. This 30 page document is available for immediate download at **redi-rock.com**.



IN THE PC DESIGN GUIDE, YOU'LL FIND:

- System overview
- Case Studies
- Description of system components
- Recommended connection design parameters
- Recommended MSEW input parameters
- Example problem

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GRAVITY WALLS

STANDARD BATTER GRAVITY WALLS

IMPORTANT NOTICE

The design specifications for Redi-Rock® blocks suggest maximum installation heights under certain assumed conditions. These wall heights were calculated using the assumed material properties and loading conditions in the *Design Resource Manual* and will vary from location to location depending on the soil properties and terrain. Since soil conditions and topography vary greatly from site to site, an engineering analysis must be performed for each wall installation.

Because Redi-Rock International does not build the blocks or install the wall system, Redi-Rock International does not assume any responsibility regarding structural stability of any particular block or particular wall system. In addition, Redi-Rock International assumes no responsibility in connection with any injury, death, or property damage claim whatsoever whether asserted against a Leasee, Leasor, Purchaser or others, arising out of or attributable to the operation of or products produced with Redi-Rock International equipment.

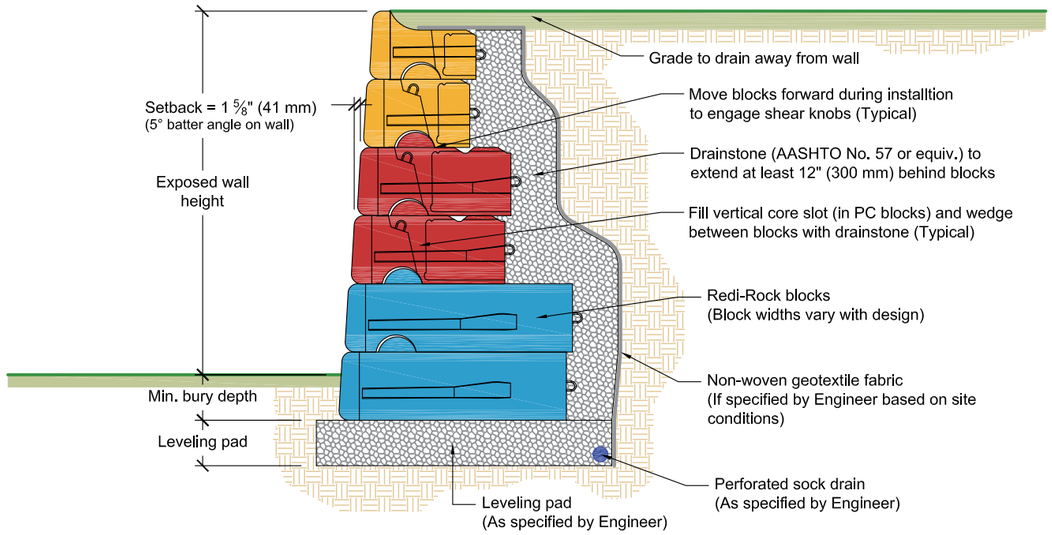
STANDARD BATTER GRAVITY WALLS

ALLOWABLE STRESS DESIGN

Preliminary Height Guide

This preliminary height guide has been prepared showing Redi-Rock walls in a variety of assumed conditions. It is intended to give the specifier an idea of what block types are required and what heights are achievable with Redi-Rock in different applications. A combination of Redi-Rock 28" (710 mm), 41" (1030 mm), and 60" (1520 mm) wide blocks with the standard 5° wall batter are used to provide the most efficient cross-section available in the different conditions.

Several assumptions have been made in preparation of the guide. They are listed in the notes below. If these assumptions do not match the wall section under consideration, block selections and achievable heights may vary from the sections shown in this guide. All wall sections for construction must be designed by a registered Professional Engineer using the actual conditions of the site.



Notes:

This preliminary guide has been prepared for three different soil types, three different load conditions, and with three different width blocks to give an indication of the performance of Redi-Rock walls. A wall batter of 5° was used for this preliminary guide. **Redi-Rock walls are not limited to these conditions.** Specific wall sections can incorporate different block setbacks and can be designed for different soil and loading conditions.

Unit weight of soil is assumed to be 120 lb/ft^3 (18.85 kN/m^3) or 130 lb/ft^3 (20.4 kN/m^3) as noted for each section of this preliminary guide.

Minimum factors of safety are 1.5 for sliding, 1.5 for overturning, 2.0 for bearing capacity, and 1.3 for global stability. Other factors of safety will result in changes from the wall heights and block selections shown in this guide.

No seismic or hydrostatic loads were included in this preliminary guide.

Ledgestone texture PC blocks were used to prepare this preliminary guide. Wall heights and block selections for other textures and blocks may vary.

A solid block without the vertical core slot was used for the bottom block on all wall sections shown.

Independent barrier design at the top of the wall must be performed for site specific conditions. Barrier requirements may result in changes to available wall heights and block selections from those shown in this guide.

Wall stability needs to be verified in the final design for site-specific conditions.

The wall design shall address both internal and external drainage and shall be evaluated by the Professional Engineer who is responsible for the final wall design.

Backfill material to be compacted to 90% modified proctor density (ASTM D1557).

All Redi-Rock International Wall System Specifications and installation recommendations should be followed.

Construction oversight should be provided on all walls to ensure proper construction according to your detailed design drawings.

Not tall enough? Greater wall heights are achievable with select backfill, increased wall batter, and/or mechanically stabilized earth Redi-Rock walls.

Redi-Rock products are manufactured by independently owned, licensed manufacturers. Product offerings will vary between manufacturers. Contact your local manufacturer to determine what products are available for your job.

These block selection and height guides were prepared by Redi-Rock International for estimating and conceptual design purposes only. All information is believed to be true and accurate; however, Redi-Rock International assumes no responsibility for the use of these preliminary guides for actual construction. Determination of the suitability of each preliminary guide is the sole responsibility of the user. **Final designs for construction purposes must be performed by a registered Professional Engineer, using the actual conditions of the proposed site.**

STANDARD BATTER GRAVITY WALLS

ALLOWABLE STRESS DESIGN

Preliminary Height Guide

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

Standard batter gravity walls	SECTION 1 OF 4
Assumed retained and foundation soils for this Section	SW, GW
Internal angle of friction	ϕ = 34°
Unit weight	γ = 130 lb / ft^3 (20.4 kN / m^3)
Cohesion	c = 0 lb / ft^2 (0 kPa)

STANDARD BATTER GRAVITY WALLS

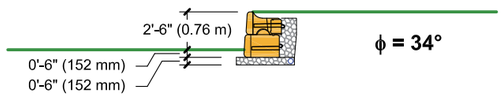
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

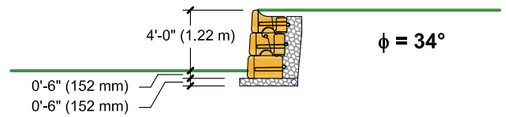
ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

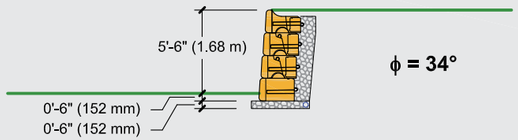
2 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks



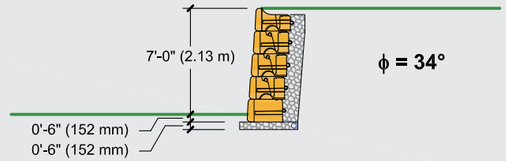
3 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks



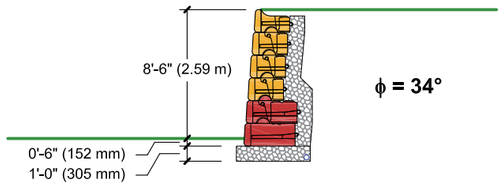
4 BLOCK HIGH SECTION
(4) 28" (710 mm) Blocks



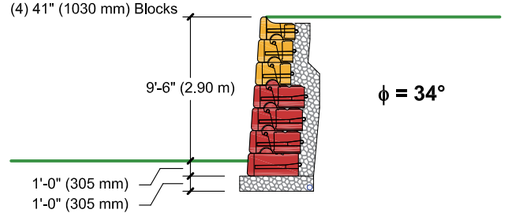
5 BLOCK HIGH SECTION
(5) 28" (710 mm) Blocks



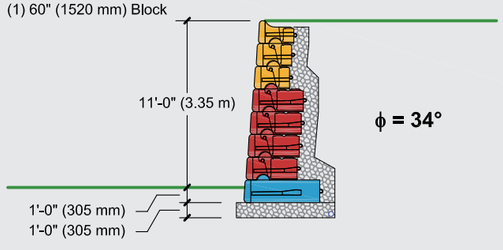
6 BLOCK HIGH SECTION
(4) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks



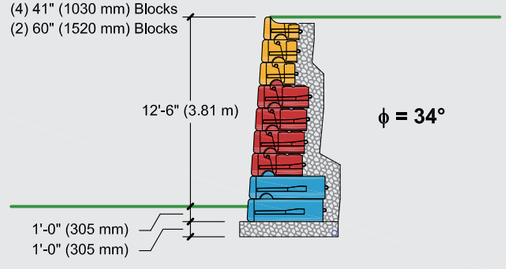
7 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks
(4) 41" (1030 mm) Blocks



8 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks
(4) 41" (1030 mm) Blocks
(1) 60" (1520 mm) Block



9 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks
(4) 41" (1030 mm) Blocks
(2) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

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STANDARD BATTER GRAVITY WALLS

ALLOWABLE STRESS DESIGN

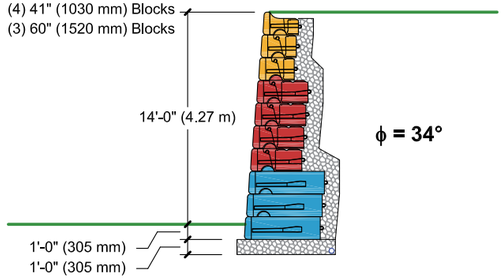
Preliminary Height Guide

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

10 BLOCK HIGH SECTION

(3) 28" (710 mm) Blocks
(4) 41" (1030 mm) Blocks
(3) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

STANDARD BATTER GRAVITY WALLS

ALLOWABLE STRESS DESIGN

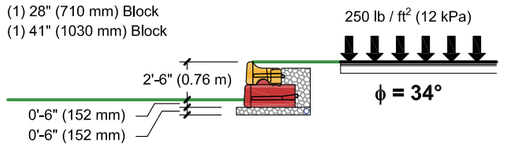
Preliminary Height Guide

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

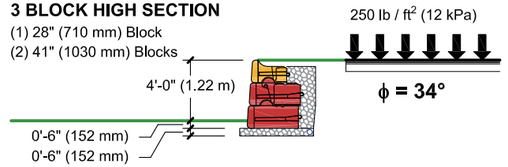
2 BLOCK HIGH SECTION

(1) 28" (710 mm) Block
(1) 41" (1030 mm) Block



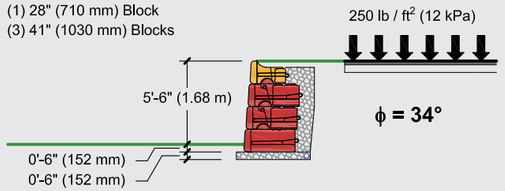
3 BLOCK HIGH SECTION

(1) 28" (710 mm) Block
(2) 41" (1030 mm) Blocks



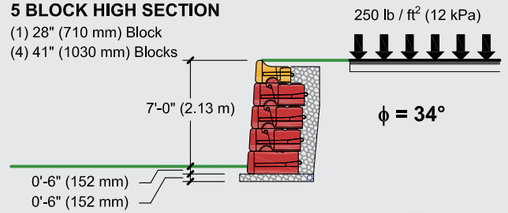
4 BLOCK HIGH SECTION

(1) 28" (710 mm) Block
(3) 41" (1030 mm) Blocks



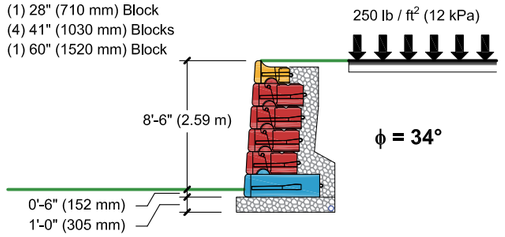
5 BLOCK HIGH SECTION

(1) 28" (710 mm) Block
(4) 41" (1030 mm) Blocks



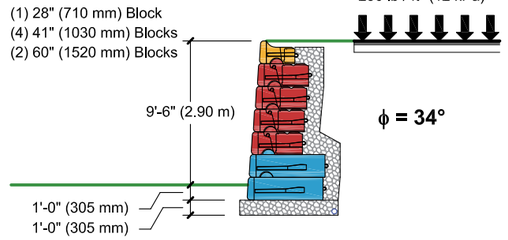
6 BLOCK HIGH SECTION

(1) 28" (710 mm) Block
(4) 41" (1030 mm) Blocks
(1) 60" (1520 mm) Block



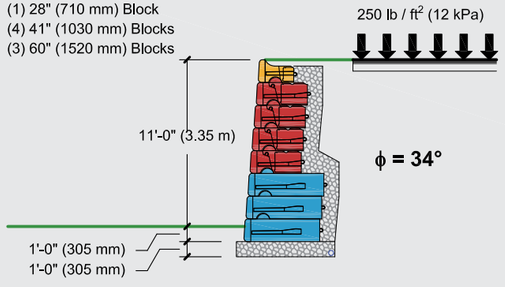
7 BLOCK HIGH SECTION

(1) 28" (710 mm) Block
(4) 41" (1030 mm) Blocks
(2) 60" (1520 mm) Blocks



8 BLOCK HIGH SECTION

(1) 28" (710 mm) Block
(4) 41" (1030 mm) Blocks
(3) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

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STANDARD BATTER GRAVITY WALLS

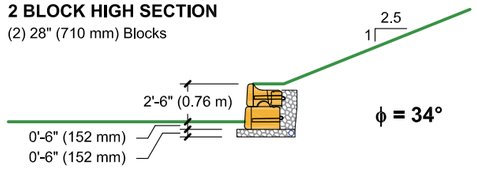
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

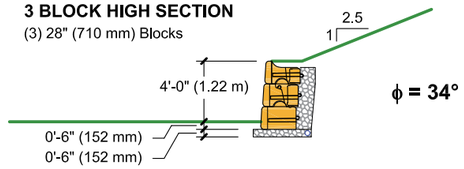
ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION C | 1 : 2.5 BACK SLOPE, NO TOE SLOPE, NO LIVE LOAD SURCHARGE

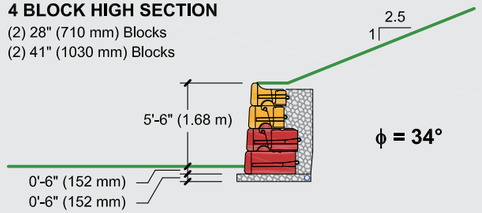
2 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks



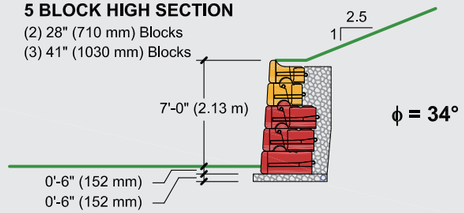
3 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks



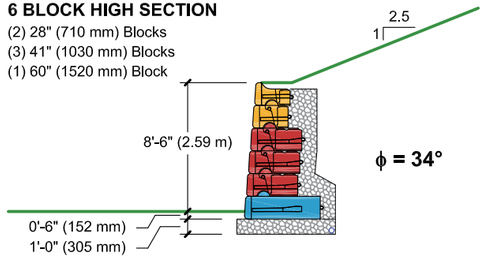
4 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks



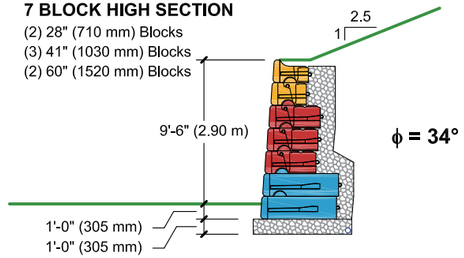
5 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks
(3) 41" (1030 mm) Blocks



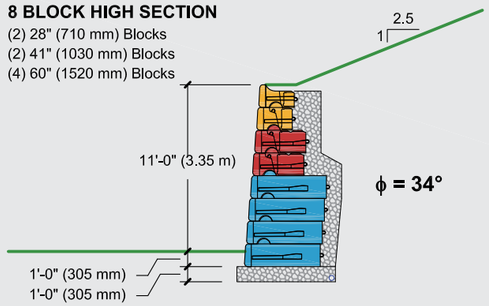
6 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks
(3) 41" (1030 mm) Blocks
(1) 60" (1520 mm) Block



7 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks
(3) 41" (1030 mm) Blocks
(2) 60" (1520 mm) Blocks



8 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(4) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

STANDARD BATTER GRAVITY WALLS

ALLOWABLE STRESS DESIGN

Preliminary Height Guide

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

Standard batter gravity walls	SECTION 2 OF 4
Assumed retained and foundation soils for this Section	SW, SP, SM
Internal angle of friction	ϕ = 30°
Unit weight	γ = 120 lb / ft^3 (18.8 kN / m^3)
Cohesion	c = 0 lb / ft^2 (0 kPa)

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STANDARD BATTER GRAVITY WALLS

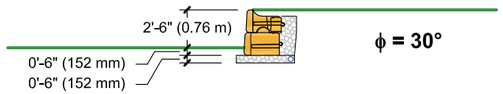
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

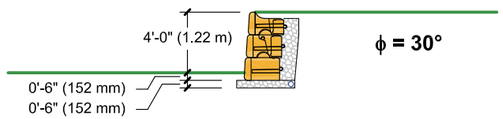
ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

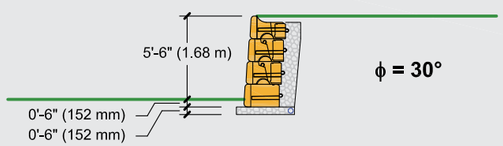
2 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks



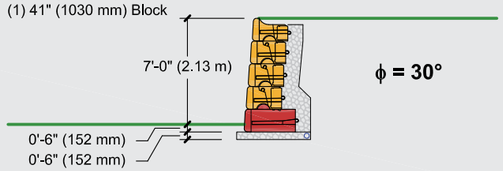
3 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks



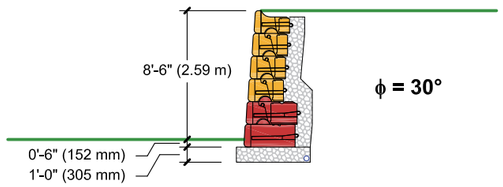
4 BLOCK HIGH SECTION
(4) 28" (710 mm) Blocks



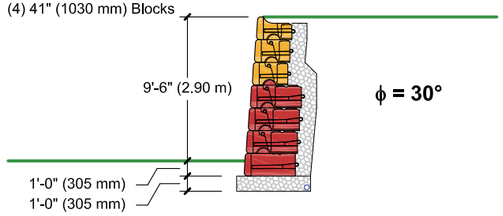
5 BLOCK HIGH SECTION
(4) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block



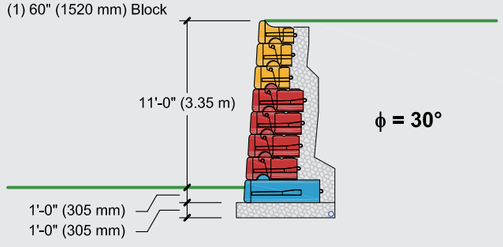
6 BLOCK HIGH SECTION
(4) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks



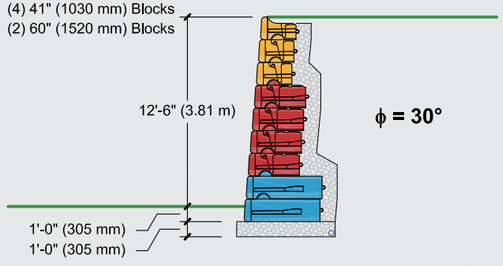
7 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks
(4) 41" (1030 mm) Blocks



8 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks
(4) 41" (1030 mm) Blocks
(1) 60" (1520 mm) Block



9 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks
(4) 41" (1030 mm) Blocks
(2) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

STANDARD BATTER GRAVITY WALLS

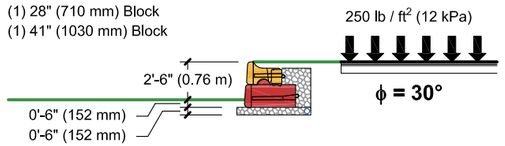
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

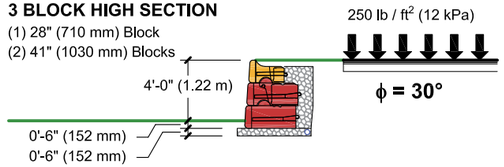
ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

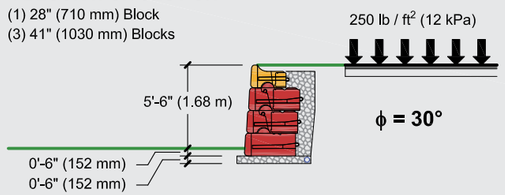
2 BLOCK HIGH SECTION
(1) 28" (710 mm) Block
(1) 41" (1030 mm) Block



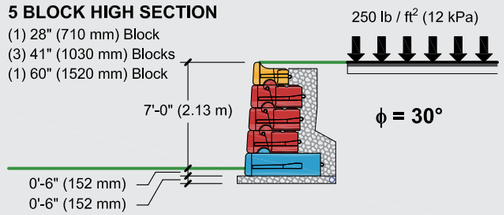
3 BLOCK HIGH SECTION
(1) 28" (710 mm) Block
(2) 41" (1030 mm) Blocks



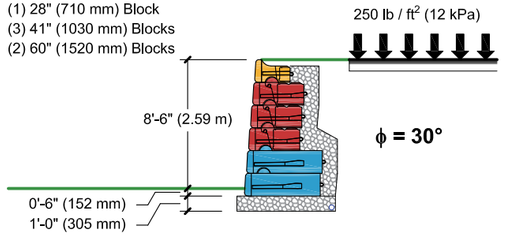
4 BLOCK HIGH SECTION
(1) 28" (710 mm) Block
(3) 41" (1030 mm) Blocks



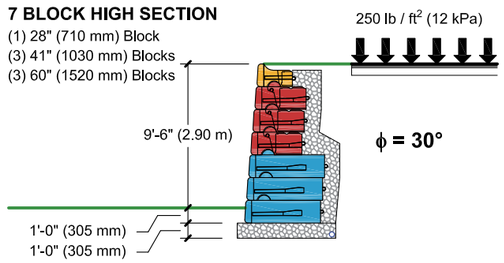
5 BLOCK HIGH SECTION
(1) 28" (710 mm) Block
(3) 41" (1030 mm) Blocks
(1) 60" (1520 mm) Block



6 BLOCK HIGH SECTION
(1) 28" (710 mm) Block
(3) 41" (1030 mm) Blocks
(2) 60" (1520 mm) Blocks



7 BLOCK HIGH SECTION
(1) 28" (710 mm) Block
(3) 41" (1030 mm) Blocks
(3) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

STANDARD BATTER GRAVITY WALLS

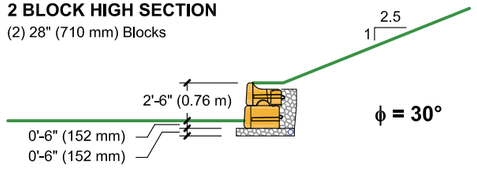
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

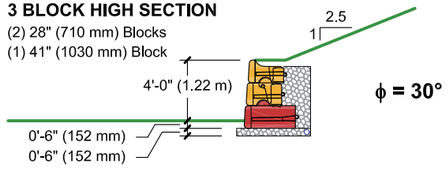
ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION C | 1 : 2.5 BACK SLOPE, NO TOE SLOPE, NO LIVE LOAD SURCHARGE

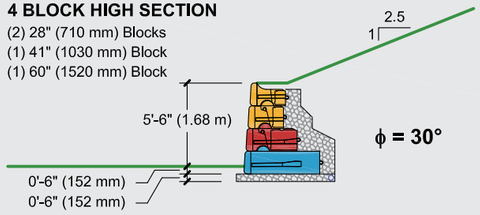
2 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks



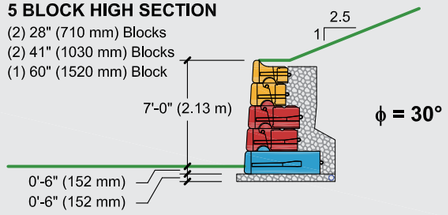
3 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block



4 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 60" (1520 mm) Block



5 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(1) 60" (1520 mm) Block



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

STANDARD BATTER GRAVITY WALLS

ALLOWABLE STRESS DESIGN

Preliminary Height Guide

ϕ = 28° | SILTY SAND or CLAYEY SAND

Standard batter gravity walls	SECTION 3 OF 4
Assumed retained and foundation soils for this Section	SM, SC
Internal angle of friction	ϕ = 28°
Unit weight	γ = 120 lb / ft^3 (18.8 kN / m^3)
Cohesion	c = 0 lb / ft^2 (0 kPa)

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STANDARD BATTER GRAVITY WALLS

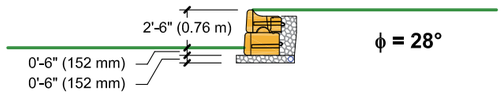
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

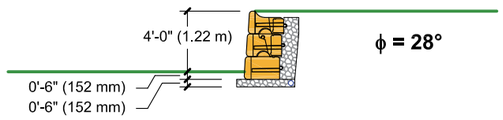
ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

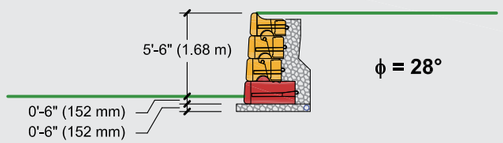
2 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks



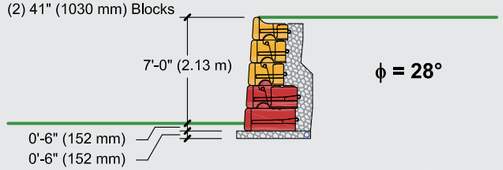
3 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks



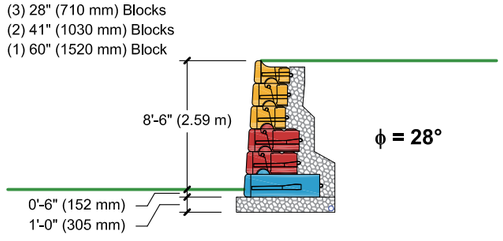
4 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block



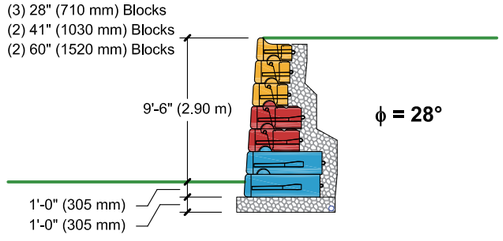
5 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks



6 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(1) 60" (1520 mm) Block



7 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(2) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

STANDARD BATTER GRAVITY WALLS

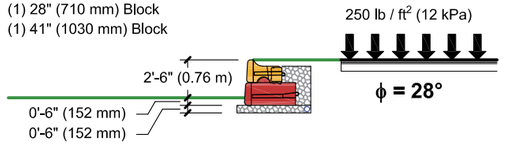
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

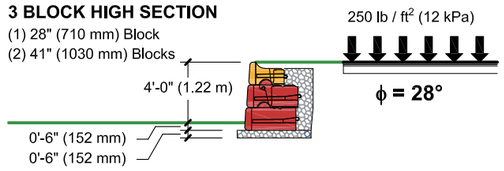
ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

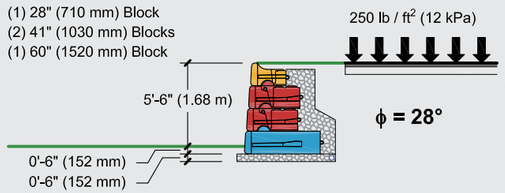
2 BLOCK HIGH SECTION
(1) 28" (710 mm) Block
(1) 41" (1030 mm) Block



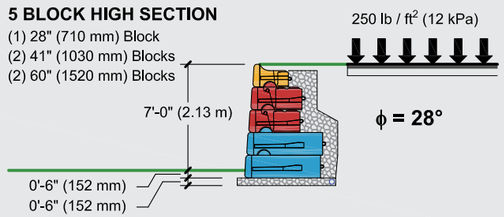
3 BLOCK HIGH SECTION
(1) 28" (710 mm) Block
(2) 41" (1030 mm) Blocks



4 BLOCK HIGH SECTION
(1) 28" (710 mm) Block
(2) 41" (1030 mm) Blocks
(1) 60" (1520 mm) Block



5 BLOCK HIGH SECTION
(1) 28" (710 mm) Block
(2) 41" (1030 mm) Blocks
(2) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

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STANDARD BATTER GRAVITY WALLS

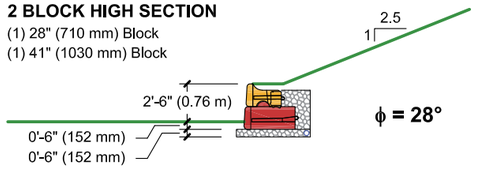
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

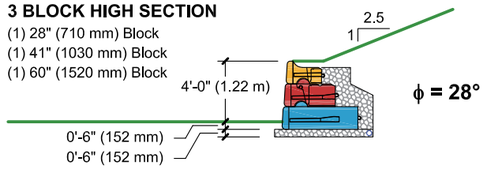
ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION C | 1 : 2.5 BACK SLOPE, NO TOE SLOPE, NO LIVE LOAD SURCHARGE

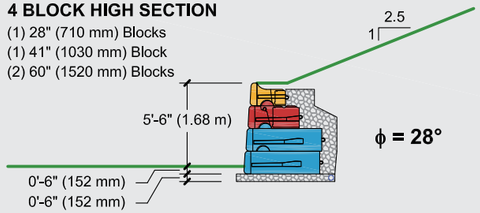
2 BLOCK HIGH SECTION
(1) 28" (710 mm) Block
(1) 41" (1030 mm) Block



3 BLOCK HIGH SECTION
(1) 28" (710 mm) Block
(1) 41" (1030 mm) Block
(1) 60" (1520 mm) Block



4 BLOCK HIGH SECTION
(1) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(2) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

STANDARD BATTER GRAVITY WALLS

ALLOWABLE STRESS DESIGN

Preliminary Height Guide

ϕ = 40° over 26° | CRUSHED STONE BACKFILL REPLACEING SILTY or CLAYEY SAND

Standard batter gravity walls	SECTION 4 OF 4
Assumed select backfill / retained soil for this Section *	GW, GP
Internal angle of friction	ϕ = 40°
Unit weight	γ = 130 lb / ft^3 (20.4 kN / m^3)
Cohesion	c = 0 lb / ft^2 (0 kPa)
Assumed native / foundation soil for this Section	SM, SC
Internal angle of friction	ϕ = 26°
Unit weight	γ = 120 lb / ft^3 (18.8 kN / m^3)
Cohesion	c = 0 lb / ft^2 (0 kPa)

* This analysis assumes native material is removed to a 1 on 1 slope or flatter from the back of the proposed retaining wall blocks and replaced with compacted crushed stone.

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STANDARD BATTER GRAVITY WALLS

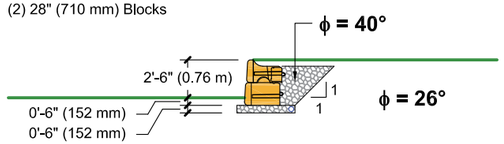
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

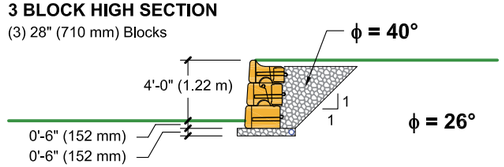
ϕ = 40° over 26° | CRUSHED STONE BACKFILL REPLACING SILTY or CLAYEY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

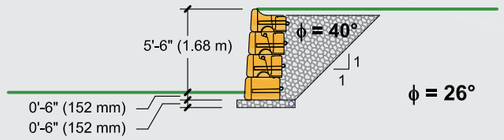
2 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks



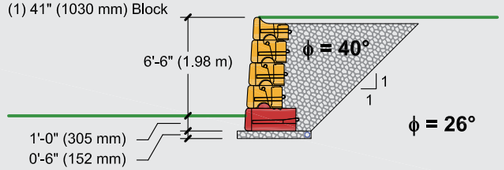
3 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks



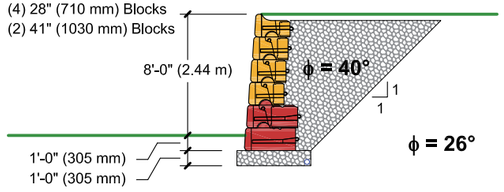
4 BLOCK HIGH SECTION
(4) 28" (710 mm) Blocks



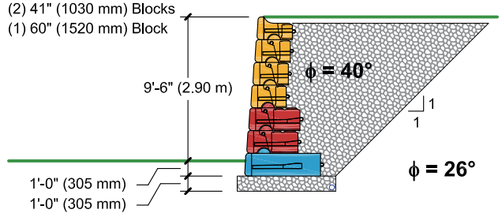
5 BLOCK HIGH SECTION
(4) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block



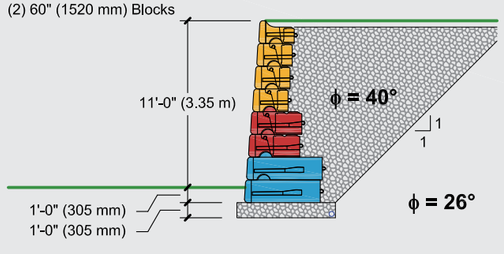
6 BLOCK HIGH SECTION
(4) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks



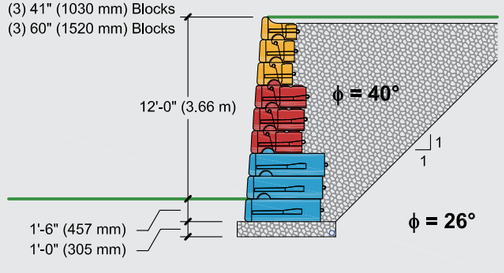
7 BLOCK HIGH SECTION
(4) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(1) 60" (1520 mm) Block



8 BLOCK HIGH SECTION
(4) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(2) 60" (1520 mm) Blocks



9 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks
(3) 41" (1030 mm) Blocks
(3) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

STANDARD BATTER GRAVITY WALLS

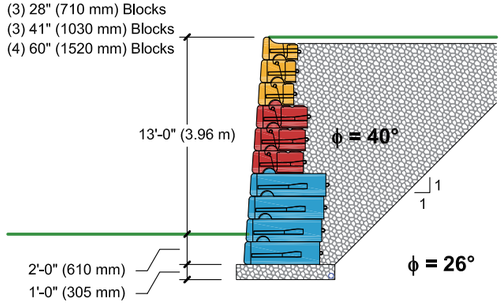
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

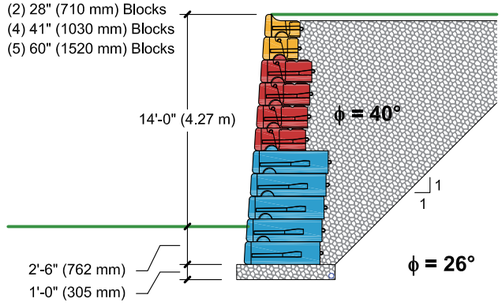
ϕ = 40° over 26° | CRUSHED STONE BACKFILL REPLACING SILTY or CLAYEY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

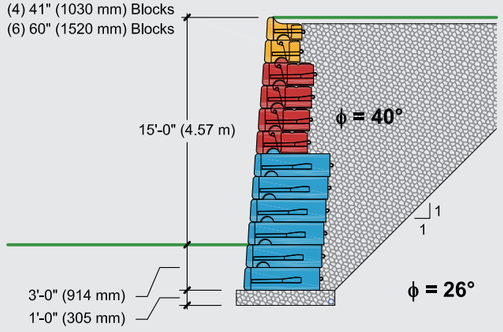
10 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks
(3) 41" (1030 mm) Blocks
(4) 60" (1520 mm) Blocks



11 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks
(4) 41" (1030 mm) Blocks
(5) 60" (1520 mm) Blocks



12 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks
(4) 41" (1030 mm) Blocks
(6) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

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STANDARD BATTER GRAVITY WALLS

ALLOWABLE STRESS DESIGN

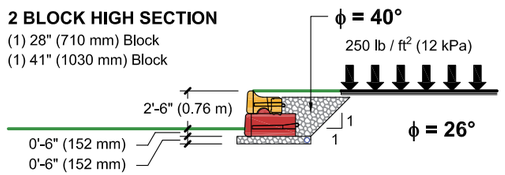
Preliminary Height Guide

ϕ = 40° over 26° | CRUSHED STONE BACKFILL REPLACING SILTY or CLAYEY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

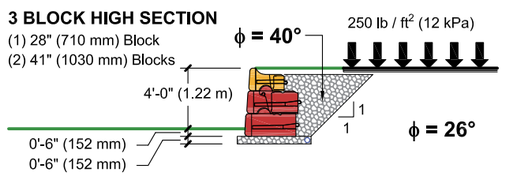
2 BLOCK HIGH SECTION

(1) 28" (710 mm) Block
(1) 41" (1030 mm) Block



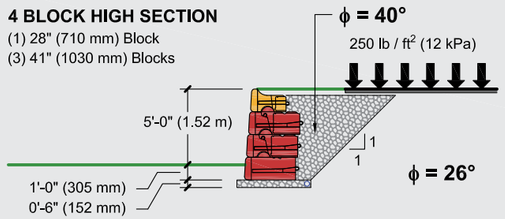
3 BLOCK HIGH SECTION

(1) 28" (710 mm) Block
(2) 41" (1030 mm) Blocks



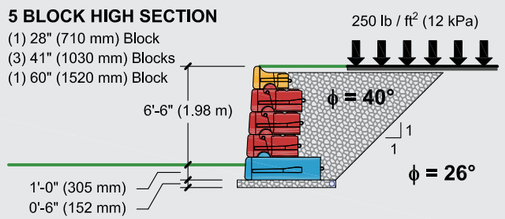
4 BLOCK HIGH SECTION

(1) 28" (710 mm) Block
(3) 41" (1030 mm) Blocks



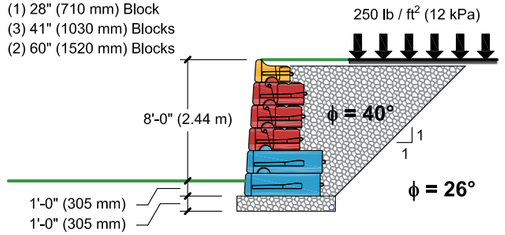
5 BLOCK HIGH SECTION

(1) 28" (710 mm) Block
(3) 41" (1030 mm) Blocks
(1) 60" (1520 mm) Block



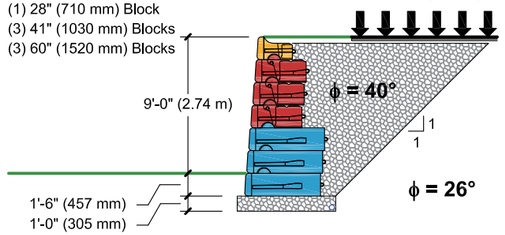
6 BLOCK HIGH SECTION

(1) 28" (710 mm) Block
(3) 41" (1030 mm) Blocks
(2) 60" (1520 mm) Blocks



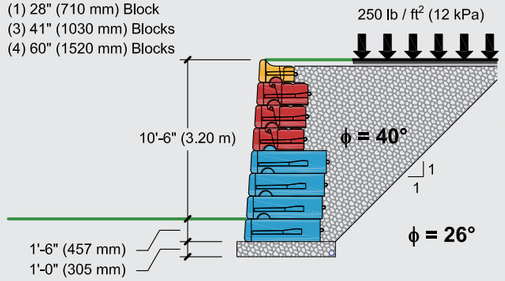
7 BLOCK HIGH SECTION

(1) 28" (710 mm) Block
(3) 41" (1030 mm) Blocks
(3) 60" (1520 mm) Blocks



8 BLOCK HIGH SECTION

(1) 28" (710 mm) Block
(3) 41" (1030 mm) Blocks
(4) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

STANDARD BATTER GRAVITY WALLS

ALLOWABLE STRESS DESIGN

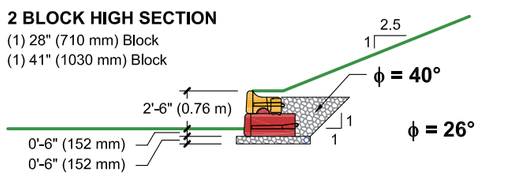
Preliminary Height Guide

ϕ = 40° over 26° | CRUSHED STONE BACKFILL REPLACING SILTY or CLAYEY SAND

LOAD CONDITION C | 1 : 2.5 BACK SLOPE, NO TOE SLOPE, NO LIVE LOAD SURCHARGE

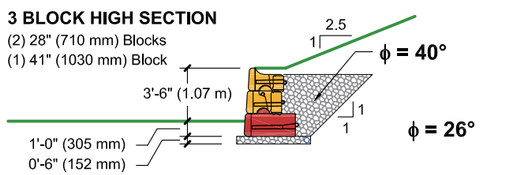
2 BLOCK HIGH SECTION

(1) 28" (710 mm) Block
(1) 41" (1030 mm) Block



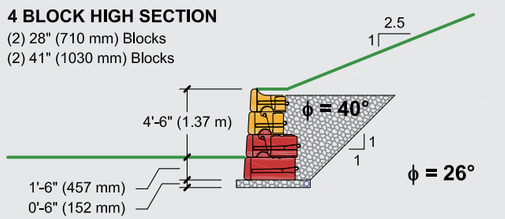
3 BLOCK HIGH SECTION

(2) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block



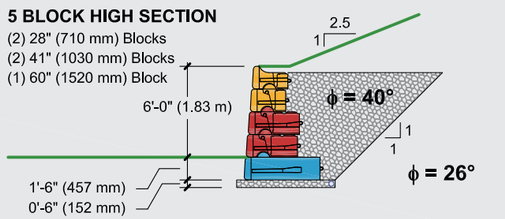
4 BLOCK HIGH SECTION

(2) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks



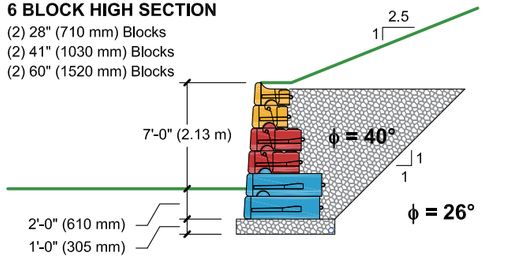
5 BLOCK HIGH SECTION

(2) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(1) 60" (1520 mm) Block



6 BLOCK HIGH SECTION

(2) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(2) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

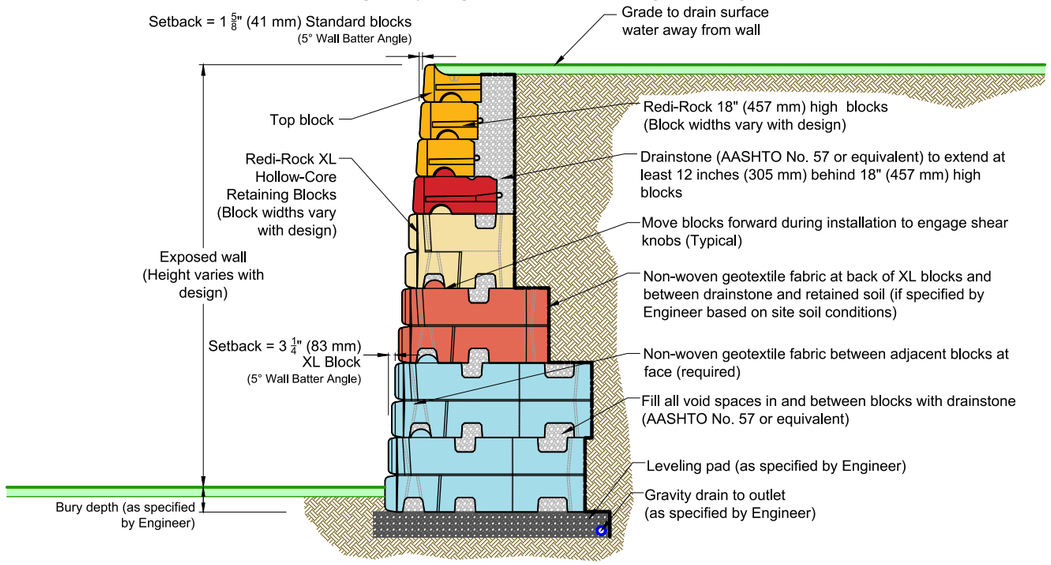
XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

ALLOWABLE STRESS DESIGN

Preliminary Height Guide

This preliminary height guide has been prepared showing Redi-Rock walls in a variety of assumed conditions. It is intended to give the specifier an idea of what block types are required and what heights are achievable with Redi-Rock in different applications. A combination of 52" (1320 mm), 72" (1830 mm), and 96" (2440 mm) XL blocks combined with 18" (457 mm) high Redi-Rock 28" (710 mm), 41" (1030 mm), and 60" (1520 mm) wide blocks are used to provide the most efficient cross-section available in the different conditions.

Several assumptions have been made in preparation of the guide. They are listed in the notes below. If these assumptions do not match the wall section under consideration, block selections and achievable heights may vary from the sections shown in this guide. All wall sections for construction must be designed by a registered Professional Engineer using the actual conditions of the site.



Notes:

This preliminary guide has been prepared for four different soil types, three different load conditions, and with six different width blocks to give an indication of the performance of Redi-Rock walls. **Redi-Rock walls are not limited to these conditions.** Specific wall sections can be designed for different soil and loading conditions.

Unit weight of soil is assumed to be 120 lb/ft^3 (18.85 kN/m^3) or 130 lb/ft^3 (20.4 kN/m^3) as noted for each section of this preliminary guide.

Minimum factors of safety are 1.5 for sliding, 1.5 for overturning, 2.0 for bearing capacity, and 1.3 for global stability. Other factors of safety will result in changes from the wall heights and block selections shown in this guide.

No seismic or hydrostatic loads were included in this preliminary guide.

Ledgestone texture blocks were used to prepare this preliminary guide. Wall heights and block selections for other textures and blocks may vary.

Independent barrier design at the top of the wall must be performed for site specific conditions. Barrier requirements may result in changes to available wall heights and block selections from those shown in this guide.

Wall stability needs to be verified in the final design for site-specific conditions.

The wall design shall address both internal and external drainage, as well as global stability, and shall be evaluated by the Professional Engineer who is responsible for the final wall design.

Backfill material should be compacted to 90% of its maximum dry density (ASTM D1557).

All Redi-Rock International Wall System Specifications and installation recommendations should be followed.

Construction oversight should be provided on all walls to ensure proper construction according to your detailed design drawings.

Not tall enough? Greater wall heights are achievable with select backfill, increased wall batter, and/or mechanically stabilized earth Redi-Rock walls.

Redi-Rock products are manufactured by independently owned, licensed manufacturers. Product offerings will vary between manufacturers. Contact your local manufacturer to determine what products are available for your job.

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

ALLOWABLE STRESS DESIGN

Preliminary Height Guide

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

XL hollow-core retaining block gravity walls	SECTION 1 OF 4
Assumed retained and foundation soils for this Section	SW, GW
Internal angle of friction	ϕ = 34°
Unit weight	γ = 130 lb / ft^3 (20.4 kN / m^3)
Cohesion	c = 0 lb / ft^2 (0 kPa)

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

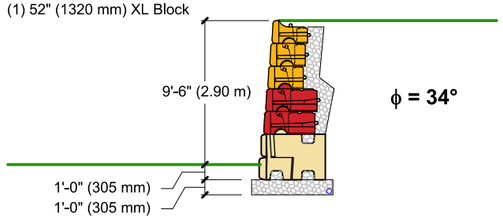
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

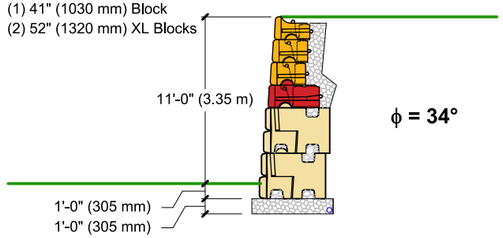
ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

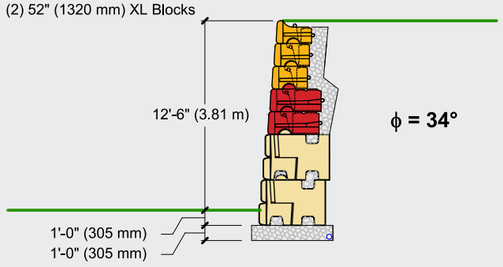
10.5-FOOT (3.20 m) HIGH SECTION
(3) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(1) 52" (1320 mm) XL Block



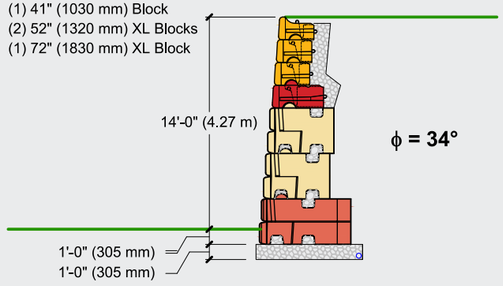
12.0-FOOT (3.66 m) HIGH SECTION
(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(2) 52" (1320 mm) XL Blocks



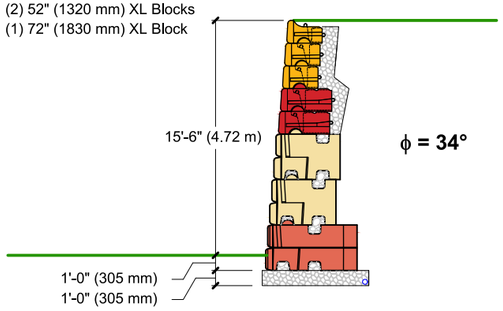
13.5-FOOT (4.11 m) HIGH SECTION
(3) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(2) 52" (1320 mm) XL Blocks



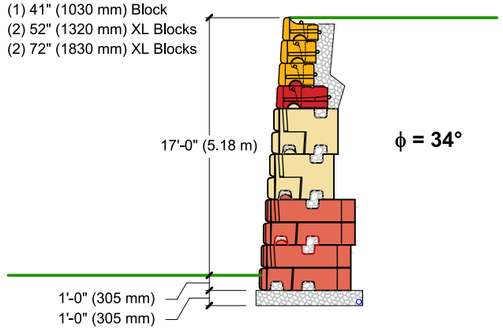
15.0-FOOT (4.57 m) HIGH SECTION
(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(2) 52" (1320 mm) XL Blocks
(1) 72" (1830 mm) XL Block



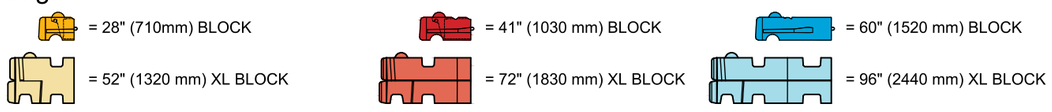
16.5-FOOT (5.03 m) HIGH SECTION
(3) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(2) 52" (1320 mm) XL Blocks
(1) 72" (1830 mm) XL Block



18.0-FOOT (5.49 m) HIGH SECTION
(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(2) 52" (1320 mm) XL Blocks
(2) 72" (1830 mm) XL Blocks



Legend:



SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

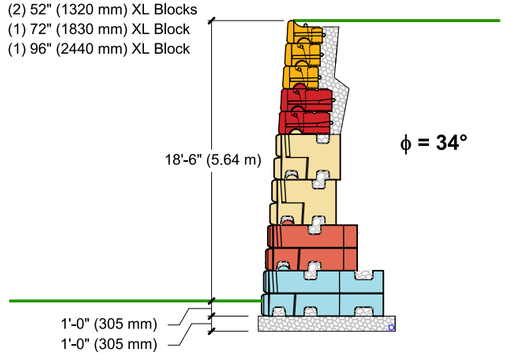
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

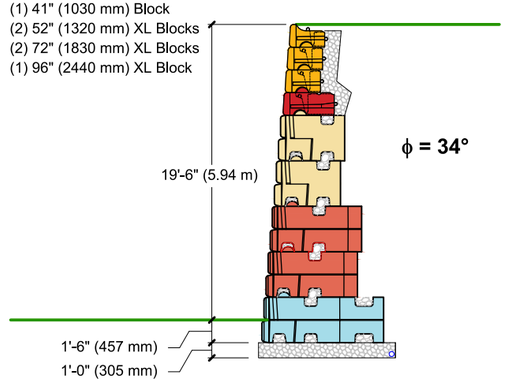
ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

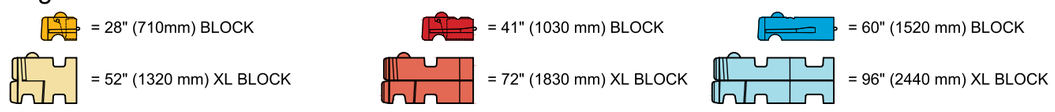
19.5-FOOT (5.94 m) HIGH SECTION
(3) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(2) 52" (1320 mm) XL Blocks
(1) 72" (1830 mm) XL Block
(1) 96" (2440 mm) XL Block



21.0-FOOT (6.40 m) HIGH SECTION
(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(2) 52" (1320 mm) XL Blocks
(2) 72" (1830 mm) XL Blocks
(1) 96" (2440 mm) XL Block



Legend:



SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

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XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

ALLOWABLE STRESS DESIGN

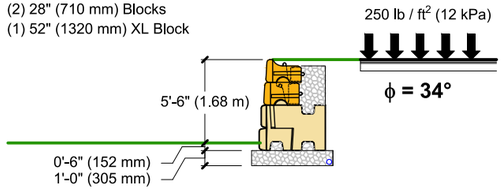
Preliminary Height Guide

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

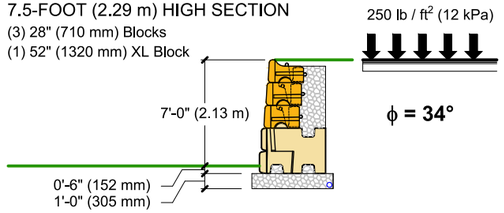
6.0-FOOT (1.83 m) HIGH SECTION

(2) 28" (710 mm) Blocks
(1) 52" (1320 mm) XL Block



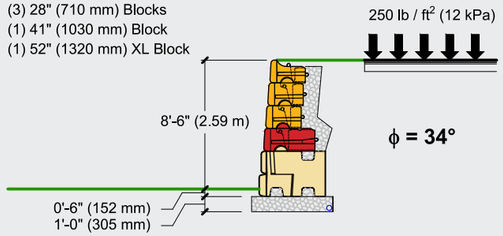
7.5-FOOT (2.29 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 52" (1320 mm) XL Block



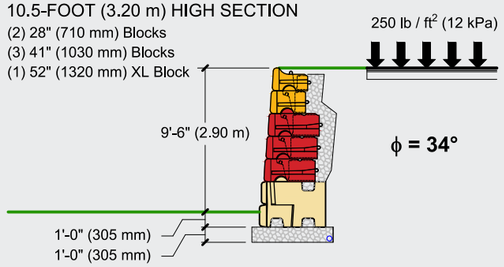
9.0-FOOT (2.74 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 52" (1320 mm) XL Block



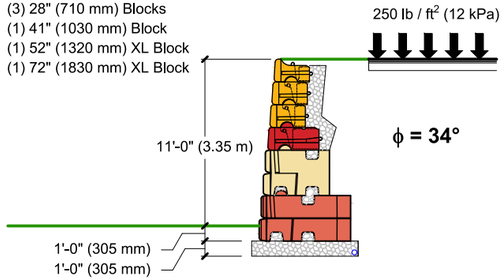
10.5-FOOT (3.20 m) HIGH SECTION

(2) 28" (710 mm) Blocks
(3) 41" (1030 mm) Blocks
(1) 52" (1320 mm) XL Block



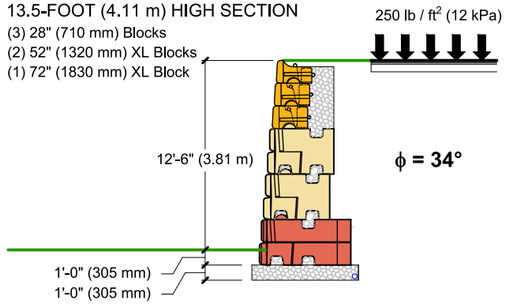
12.0-FOOT (3.66 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 52" (1320 mm) XL Block
(1) 72" (1830 mm) XL Block



13.5-FOOT (4.11 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(2) 52" (1320 mm) XL Blocks
(1) 72" (1830 mm) XL Block



Legend:

= 28" (710mm) BLOCK
= 41" (1030 mm) BLOCK
= 60" (1520 mm) BLOCK
= 52" (1320 mm) XL BLOCK
= 72" (1830 mm) XL BLOCK
= 96" (2440 mm) XL BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

ALLOWABLE STRESS DESIGN

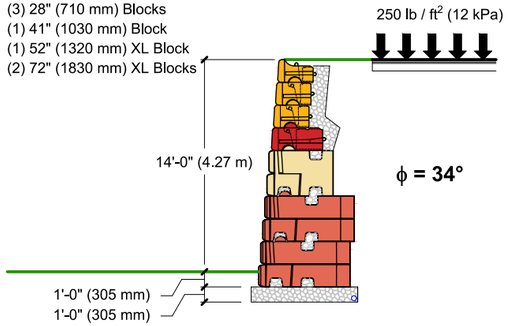
Preliminary Height Guide

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

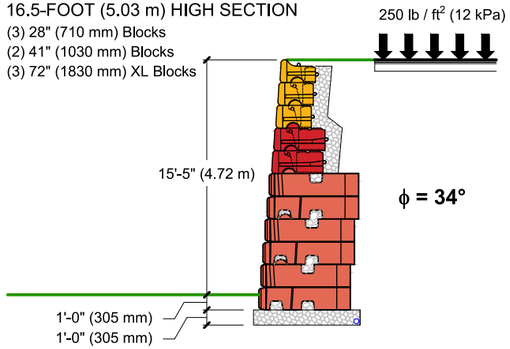
15.0-FOOT (4.57 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 52" (1320 mm) XL Block
(2) 72" (1830 mm) XL Blocks



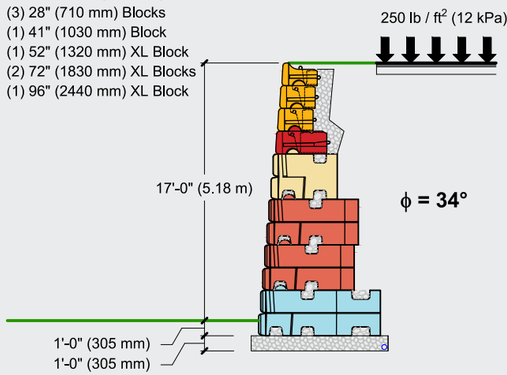
16.5-FOOT (5.03 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(3) 72" (1830 mm) XL Blocks



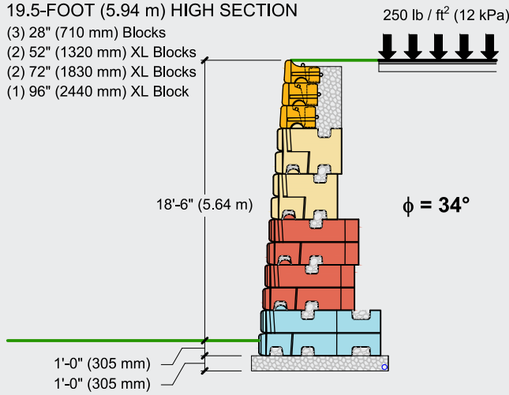
18.0-FOOT (5.49 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 52" (1320 mm) XL Block
(2) 72" (1830 mm) XL Blocks
(1) 96" (2440 mm) XL Block



19.5-FOOT (5.94 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(2) 52" (1320 mm) XL Blocks
(2) 72" (1830 mm) XL Blocks
(1) 96" (2440 mm) XL Block



Legend:

= 28" (710mm) BLOCK
= 41" (1030 mm) BLOCK
= 60" (1520 mm) BLOCK
= 52" (1320 mm) XL BLOCK
= 72" (1830 mm) XL BLOCK
= 96" (2440 mm) XL BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

ALLOWABLE STRESS DESIGN

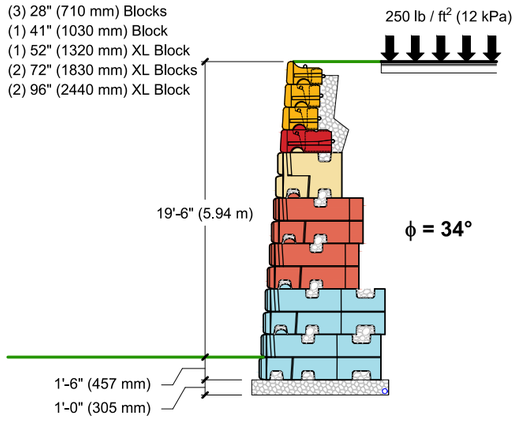
Preliminary Height Guide

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

21.0-FOOT (6.40 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 52" (1320 mm) XL Block
(2) 72" (1830 mm) XL Blocks
(2) 96" (2440 mm) XL Block



Legend:

= 28" (710mm) BLOCK
= 41" (1030 mm) BLOCK
= 60" (1520 mm) BLOCK
= 52" (1320 mm) XL BLOCK
= 72" (1830 mm) XL BLOCK
= 96" (2440 mm) XL BLOCK

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XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

ALLOWABLE STRESS DESIGN

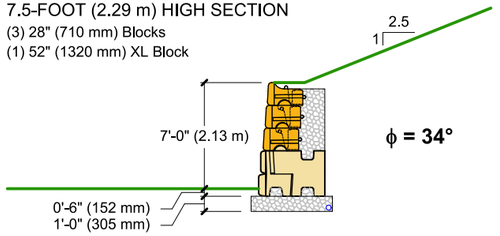
Preliminary Height Guide

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION C | 1 : 2.5 BACK SLOPE, NO TOE SLOPE, NO LIVE LOAD SURCHARGE

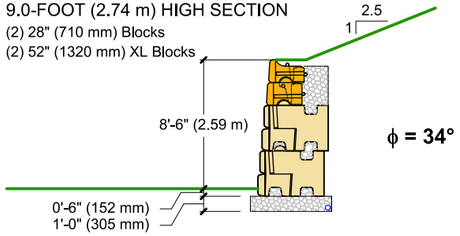
7.5-FOOT (2.29 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 52" (1320 mm) XL Block



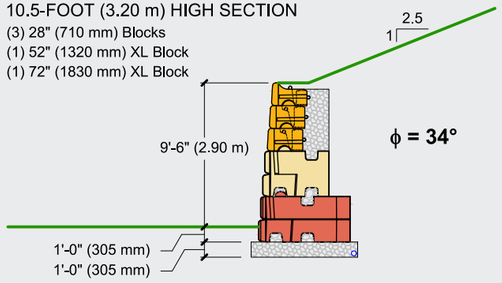
9.0-FOOT (2.74 m) HIGH SECTION

(2) 28" (710 mm) Blocks
(2) 52" (1320 mm) XL Blocks



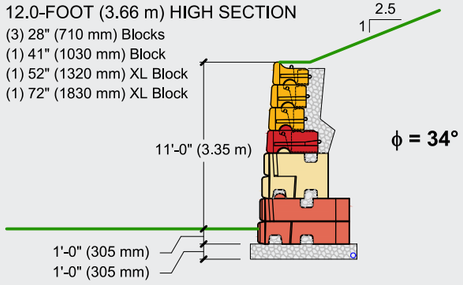
10.5-FOOT (3.20 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 52" (1320 mm) XL Block
(1) 72" (1830 mm) XL Block



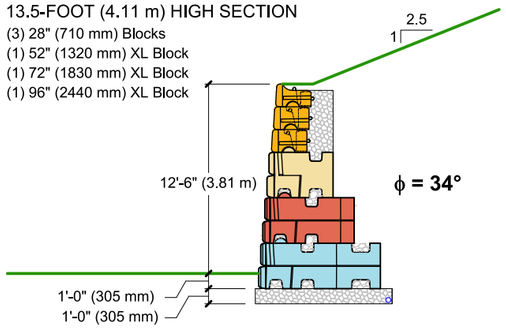
12.0-FOOT (3.66 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 52" (1320 mm) XL Block
(1) 72" (1830 mm) XL Block



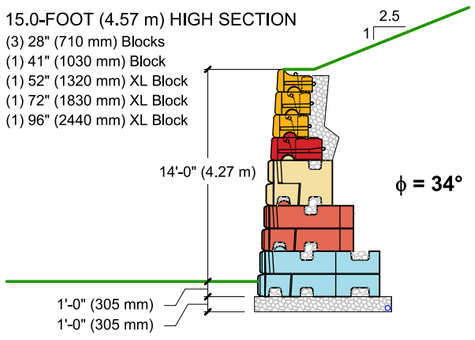
13.5-FOOT (4.11 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 52" (1320 mm) XL Block
(1) 72" (1830 mm) XL Block
(1) 96" (2440 mm) XL Block



15.0-FOOT (4.57 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 52" (1320 mm) XL Block
(1) 72" (1830 mm) XL Block
(1) 96" (2440 mm) XL Block



Legend:

= 28" (710mm) BLOCK
= 41" (1030 mm) BLOCK
= 60" (1520 mm) BLOCK
= 52" (1320 mm) XL BLOCK
= 72" (1830 mm) XL BLOCK
= 96" (2440 mm) XL BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

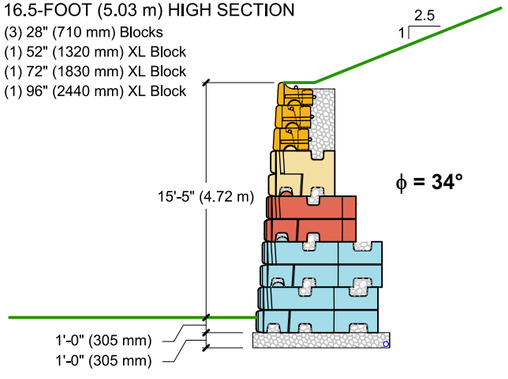
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION C | 1 : 2.5 BACK SLOPE, NO TOE SLOPE, NO LIVE LOAD SURCHARGE

16.5-FOOT (5.03 m) HIGH SECTION
(3) 28" (710 mm) Blocks
(1) 52" (1320 mm) XL Block
(1) 72" (1830 mm) XL Block
(1) 96" (2440 mm) XL Block



Legend:

= 28" (710mm) BLOCK
= 41" (1030 mm) BLOCK
= 60" (1520 mm) BLOCK
= 52" (1320 mm) XL BLOCK
= 72" (1830 mm) XL BLOCK
= 96" (2440 mm) XL BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

ALLOWABLE STRESS DESIGN

Preliminary Height Guide

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

XL hollow-core retaining block gravity walls	SECTION 2 OF 4
Assumed retained and foundation soils for this Section	SW, SP, SM
Internal angle of friction	ϕ = 30°
Unit weight	γ = 120 lb / ft^3 (18.8 kN / m^3)
Cohesion	c = 0 lb / ft^2 (0 kPa)

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

ALLOWABLE STRESS DESIGN

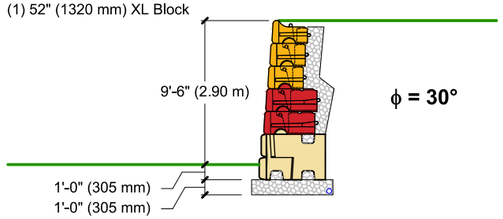
Preliminary Height Guide

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

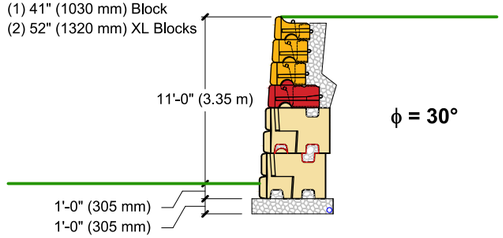
10.5-FOOT (3.20 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(1) 52" (1320 mm) XL Block



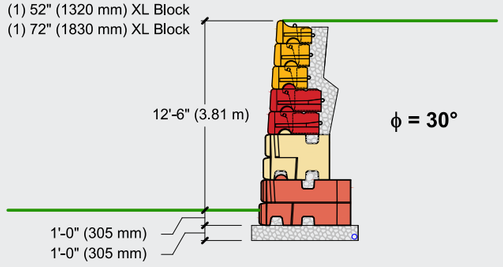
12.0-FOOT (3.66 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(2) 52" (1320 mm) XL Blocks



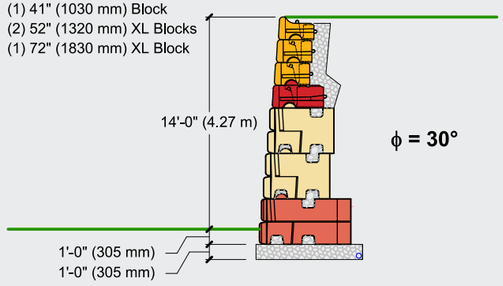
13.5-FOOT (4.11 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(1) 52" (1320 mm) XL Block
(1) 72" (1830 mm) XL Block



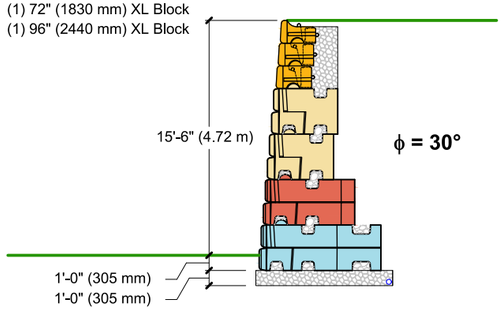
15.0-FOOT (4.57 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(2) 52" (1320 mm) XL Blocks
(1) 72" (1830 mm) XL Block



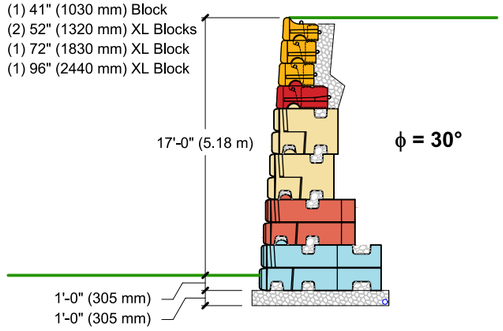
16.5-FOOT (5.03 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(2) 52" (1320 mm) XL Blocks
(1) 72" (1830 mm) XL Block
(1) 96" (2440 mm) XL Block

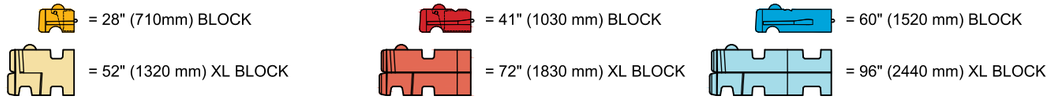


18.0-FOOT (5.49 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(2) 52" (1320 mm) XL Blocks
(1) 72" (1830 mm) XL Block
(1) 96" (2440 mm) XL Block



Legend:



SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

ALLOWABLE STRESS DESIGN

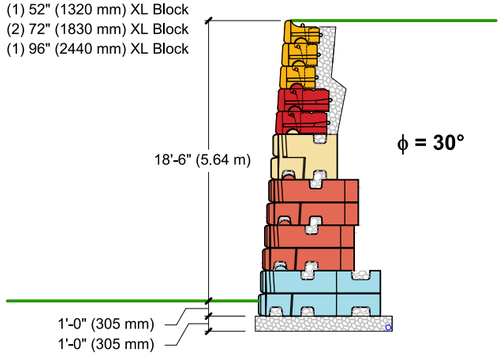
Preliminary Height Guide

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

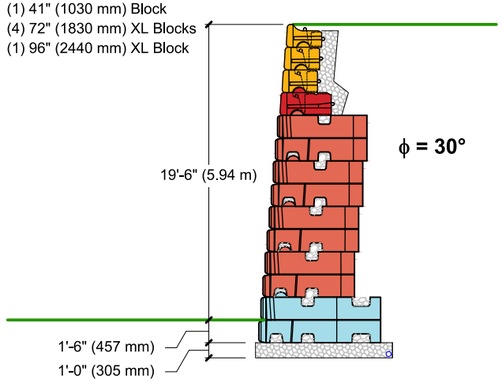
19.5-FOOT (5.94 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(1) 52" (1320 mm) XL Block
(2) 72" (1830 mm) XL Block
(1) 96" (2440 mm) XL Block

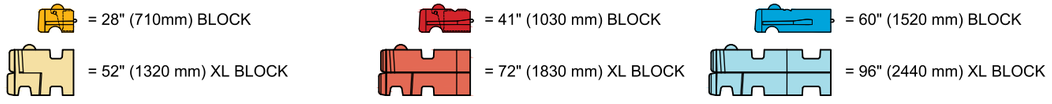


21.0-FOOT (6.40 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(4) 72" (1830 mm) XL Blocks
(1) 96" (2440 mm) XL Block



Legend:



SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

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XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

ALLOWABLE STRESS DESIGN

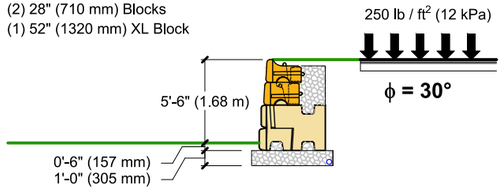
Preliminary Height Guide

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

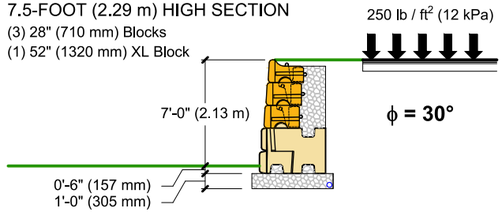
6.0-FOOT (1.83 m) HIGH SECTION

(2) 28" (710 mm) Blocks
(1) 52" (1320 mm) XL Block



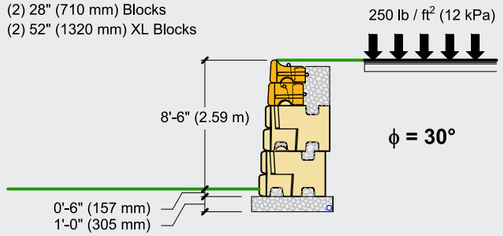
7.5-FOOT (2.29 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 52" (1320 mm) XL Block



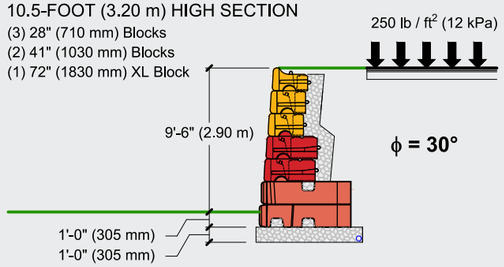
9.0-FOOT (2.74 m) HIGH SECTION

(2) 28" (710 mm) Blocks
(2) 52" (1320 mm) XL Blocks



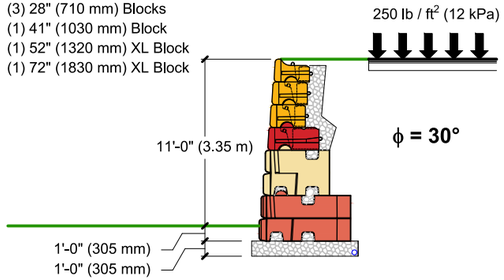
10.5-FOOT (3.20 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(1) 72" (1830 mm) XL Block



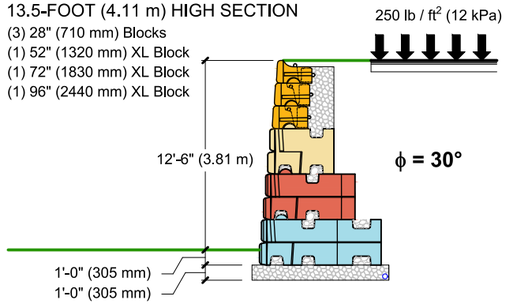
12.0-FOOT (3.66 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 52" (1320 mm) XL Block
(1) 72" (1830 mm) XL Block



13.5-FOOT (4.11 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 52" (1320 mm) XL Block
(1) 72" (1830 mm) XL Block
(1) 96" (2440 mm) XL Block



Legend:

= 28" (710mm) BLOCK
= 41" (1030 mm) BLOCK
= 60" (1520 mm) BLOCK
= 52" (1320 mm) XL BLOCK
= 72" (1830 mm) XL BLOCK
= 96" (2440 mm) XL BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

ALLOWABLE STRESS DESIGN

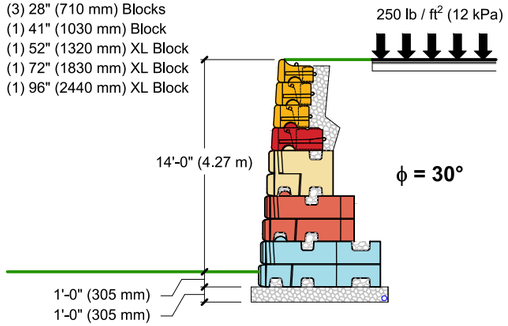
Preliminary Height Guide

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

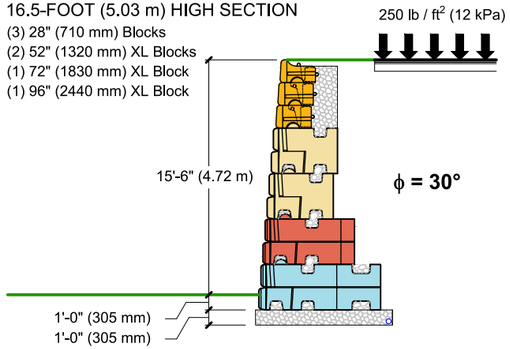
15.0-FOOT (4.57 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 52" (1320 mm) XL Block
(1) 72" (1830 mm) XL Block
(1) 96" (2440 mm) XL Block



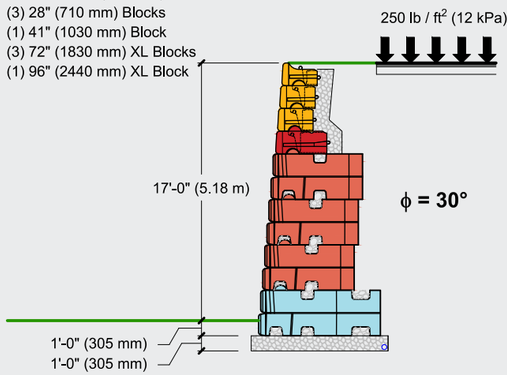
16.5-FOOT (5.03 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(2) 52" (1320 mm) XL Blocks
(1) 72" (1830 mm) XL Block
(1) 96" (2440 mm) XL Block



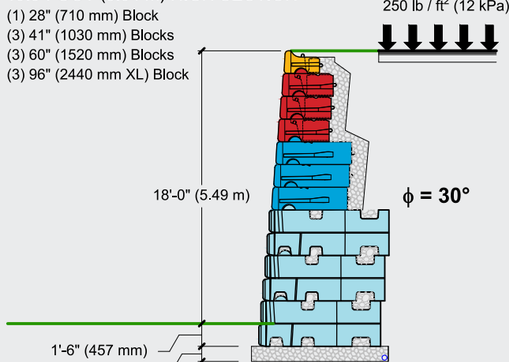
18.0-FOOT (5.49 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(3) 72" (1830 mm) XL Blocks
(1) 96" (2440 mm) XL Block



19.5-FOOT (5.94 m) HIGH SECTION

(1) 28" (710 mm) Block
(3) 41" (1030 mm) Blocks
(3) 60" (1520 mm) Blocks
(3) 96" (2440 mm XL) Block



Legend:

= 28" (710mm) BLOCK
= 41" (1030 mm) BLOCK
= 60" (1520 mm) BLOCK
= 52" (1320 mm) XL BLOCK
= 72" (1830 mm) XL BLOCK
= 96" (2440 mm) XL BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

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XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

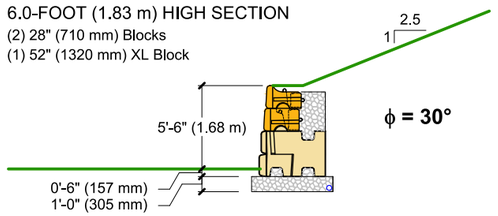
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

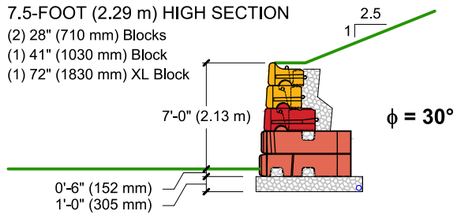
ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION C | 1 : 2.5 BACK SLOPE, NO TOE SLOPE, NO LIVE LOAD SURCHARGE

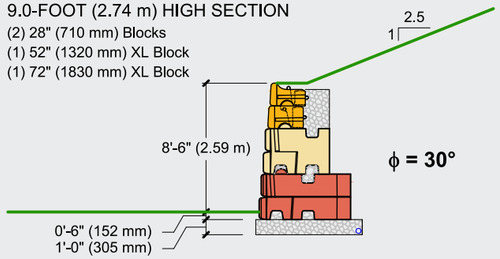
6.0-FOOT (1.83 m) HIGH SECTION
(2) 28" (710 mm) Blocks
(1) 52" (1320 mm) XL Block



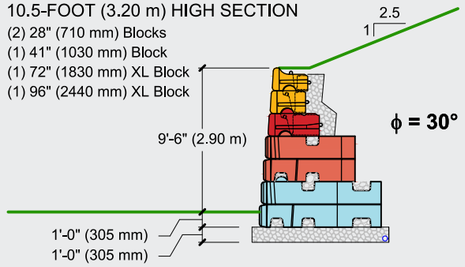
7.5-FOOT (2.29 m) HIGH SECTION
(2) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 72" (1830 mm) XL Block



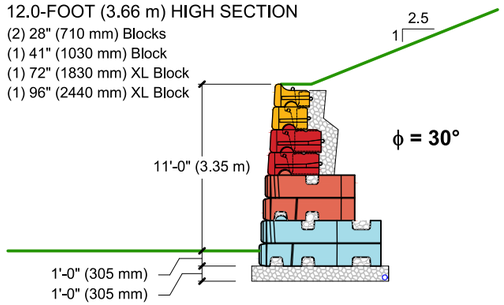
9.0-FOOT (2.74 m) HIGH SECTION
(2) 28" (710 mm) Blocks
(1) 52" (1320 mm) XL Block
(1) 72" (1830 mm) XL Block



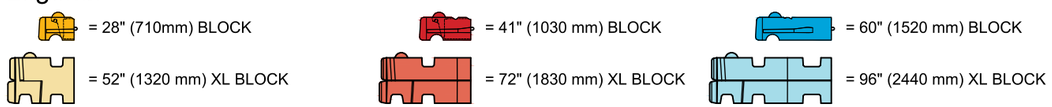
10.5-FOOT (3.20 m) HIGH SECTION
(2) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 72" (1830 mm) XL Block
(1) 96" (2440 mm) XL Block



12.0-FOOT (3.66 m) HIGH SECTION
(2) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 72" (1830 mm) XL Block
(1) 96" (2440 mm) XL Block



Legend:



SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

ALLOWABLE STRESS DESIGN

Preliminary Height Guide

ϕ = 28° | SILTY SAND or CLAYEY SAND

XL hollow-core retaining block gravity walls	SECTION 3 OF 4
Assumed retained and foundation soils for this Section	SM, SC
Internal angle of friction	ϕ = 28°
Unit weight	γ = 120 lb / ft^3 (18.8 kN / m^3)
Cohesion	c = 0 lb / ft^2 (0 kPa)

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

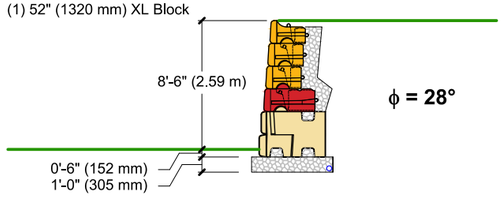
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

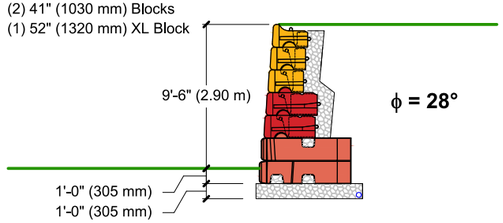
ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

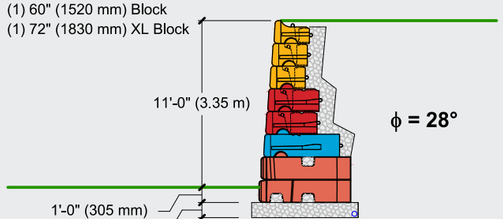
9.0-FOOT (2.74 m) HIGH SECTION
(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 52" (1320 mm) XL Block



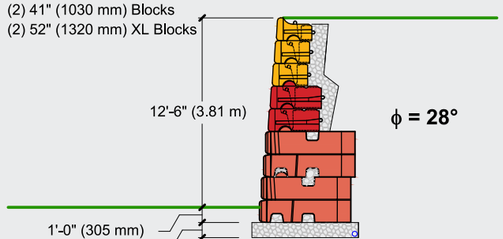
10.5-FOOT (3.20 m) HIGH SECTION
(3) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(1) 52" (1320 mm) XL Block



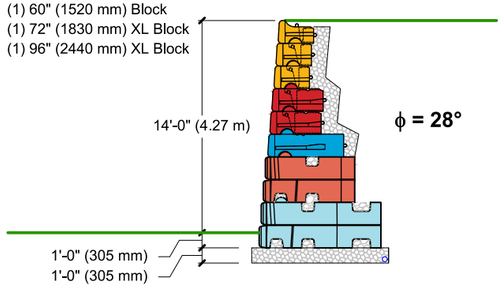
12.0-FOOT (3.66 m) HIGH SECTION
(3) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(1) 60" (1520 mm) Block
(1) 72" (1830 mm) XL Block



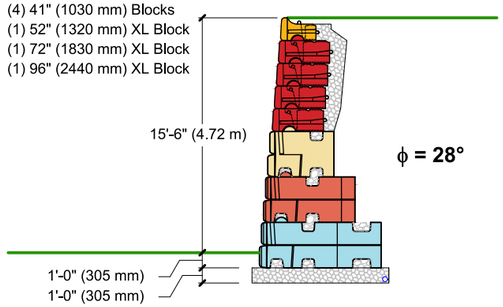
13.5-FOOT (4.11 m) HIGH SECTION
(3) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(2) 52" (1320 mm) XL Blocks



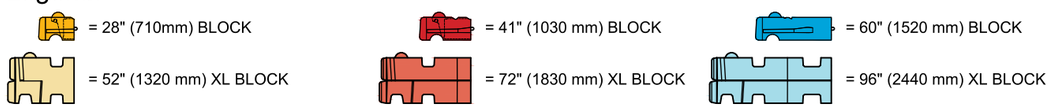
15.0-FOOT (4.57 m) HIGH SECTION
(3) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(1) 60" (1520 mm) Block
(1) 72" (1830 mm) XL Block
(1) 96" (2440 mm) XL Block



16.5-FOOT (5.03 m) HIGH SECTION
(1) 28" (710 mm) Block
(4) 41" (1030 mm) Blocks
(1) 52" (1320 mm) XL Block
(1) 72" (1830 mm) XL Block
(1) 96" (2440 mm) XL Block



Legend:



SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

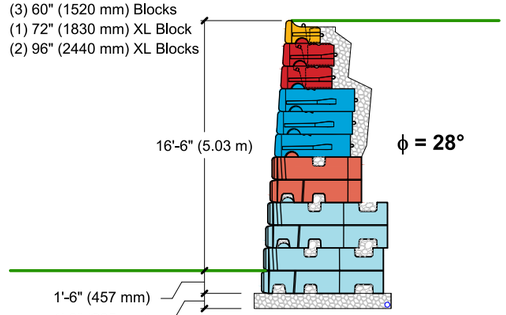
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

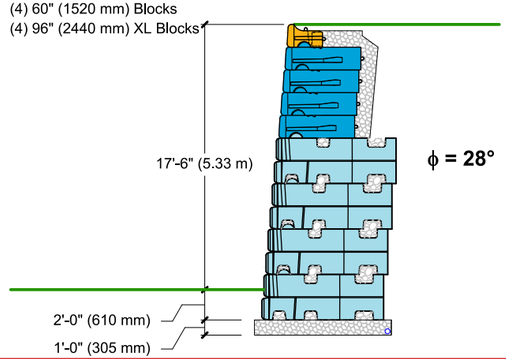
ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

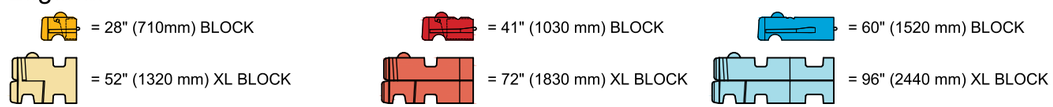
18.0-FOOT (5.49 m) HIGH SECTION
(1) 28" (710 mm) Blocks
(2) 41" (1030 mm) Block
(3) 60" (1520 mm) Blocks
(1) 72" (1830 mm) XL Block
(2) 96" (2440 mm) XL Blocks



19.5-FOOT (5.94 m) HIGH SECTION
(1) 28" (710 mm) Blocks
(4) 60" (1520 mm) Blocks
(4) 96" (2440 mm) XL Blocks



Legend:



SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

ALLOWABLE STRESS DESIGN

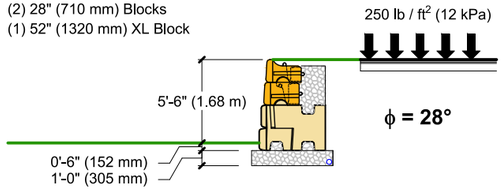
Preliminary Height Guide

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

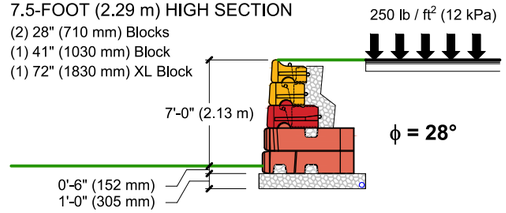
6.0-FOOT (1.83 m) HIGH SECTION

(2) 28" (710 mm) Blocks
(1) 52" (1320 mm) XL Block



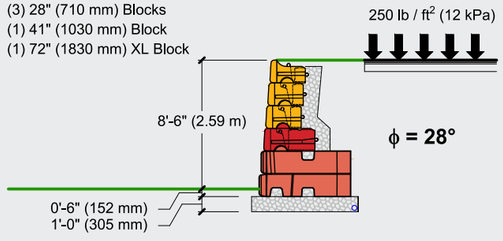
7.5-FOOT (2.29 m) HIGH SECTION

(2) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 72" (1830 mm) XL Block



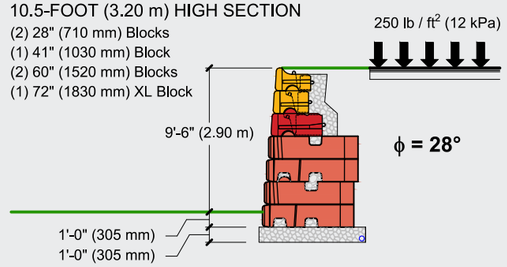
9.0-FOOT (2.74 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 72" (1830 mm) XL Block



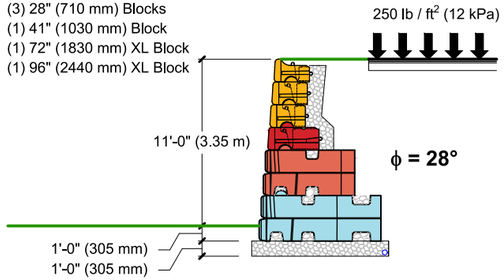
10.5-FOOT (3.20 m) HIGH SECTION

(2) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(2) 60" (1520 mm) Blocks
(1) 72" (1830 mm) XL Block



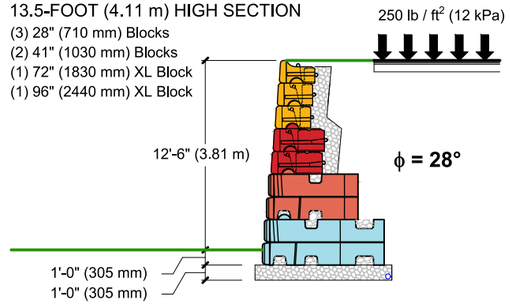
12.0-FOOT (3.66 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 72" (1830 mm) XL Block
(1) 96" (2440 mm) XL Block



13.5-FOOT (4.11 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(1) 72" (1830 mm) XL Block
(1) 96" (2440 mm) XL Block



Legend:

= 28" (710mm) BLOCK
= 41" (1030 mm) BLOCK
= 60" (1520 mm) BLOCK
= 52" (1320 mm) XL BLOCK
= 72" (1830 mm) XL BLOCK
= 96" (2440 mm) XL BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

ALLOWABLE STRESS DESIGN

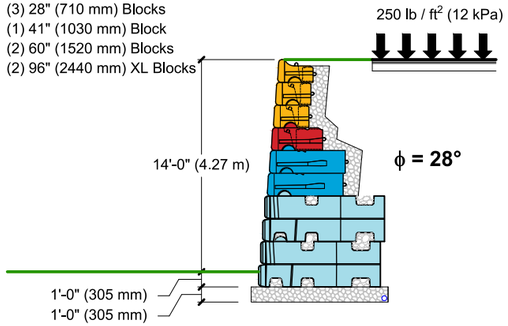
Preliminary Height Guide

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

15.0-FOOT (4.57 m) HIGH SECTION

(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(2) 60" (1520 mm) Blocks
(2) 96" (2440 mm) XL Blocks



Legend:

= 28" (710mm) BLOCK
= 41" (1030 mm) BLOCK
= 60" (1520 mm) BLOCK
= 52" (1320 mm) XL BLOCK
= 72" (1830 mm) XL BLOCK
= 96" (2440 mm) XL BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

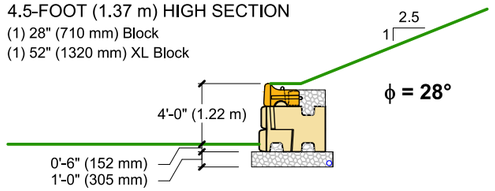
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

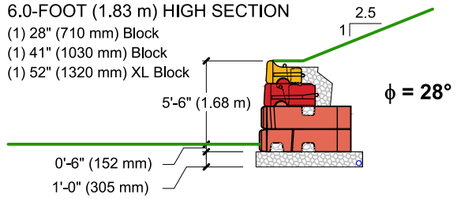
ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION C | 1 : 2.5 BACK SLOPE, NO TOE SLOPE, NO LIVE LOAD SURCHARGE

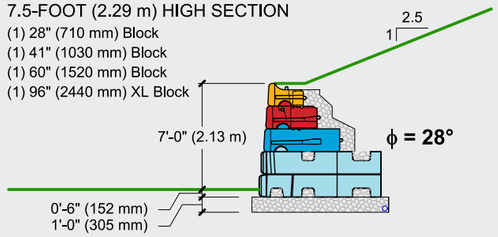
4.5-FOOT (1.37 m) HIGH SECTION
(1) 28" (710 mm) Block
(1) 52" (1320 mm) XL Block



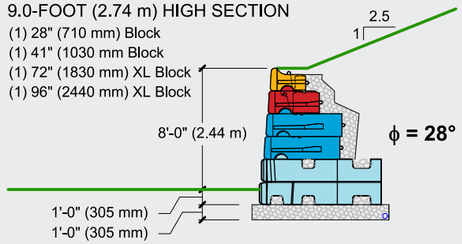
6.0-FOOT (1.83 m) HIGH SECTION
(1) 28" (710 mm) Block
(1) 41" (1030 mm) Block
(1) 52" (1320 mm) XL Block



7.5-FOOT (2.29 m) HIGH SECTION
(1) 28" (710 mm) Block
(1) 41" (1030 mm) Block
(1) 60" (1520 mm) Block
(1) 96" (2440 mm) XL Block



9.0-FOOT (2.74 m) HIGH SECTION
(1) 28" (710 mm) Block
(1) 41" (1030 mm Block
(1) 72" (1830 mm) XL Block
(1) 96" (2440 mm) XL Block



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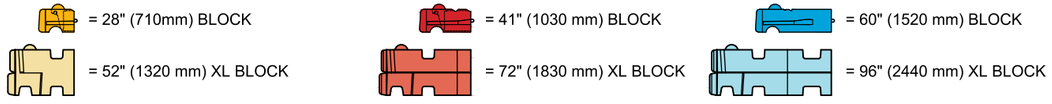

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

ALLOWABLE STRESS DESIGN

Preliminary Height Guide

ϕ = 40° over 26° | CRUSHED STONE BACKFILL REPLACING SILTY or CLAYEY SAND

XL hollow-core retaining block gravity walls	SECTION 4 OF 4
Assumed select backfill / retained soil for this Section *	GW, GP
Internal angle of friction	ϕ = 40°
Unit weight	γ = 130 lb / ft^3 (20.4 kN / m^3)
Cohesion	c = 0 lb / ft^2 (0 kPa)
Assumed native / foundation soil for this Section	SM, SC
Internal angle of friction	ϕ = 26°
Unit weight	γ = 120 lb / ft^3 (18.8 kN / m^3)
Cohesion	c = 0 lb / ft^2 (0 kPa)

* This analysis assumes native material is removed to a 1 on 1 slope or flatter from the back of the proposed retaining wall blocks and replaced with compacted crushed stone.

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XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

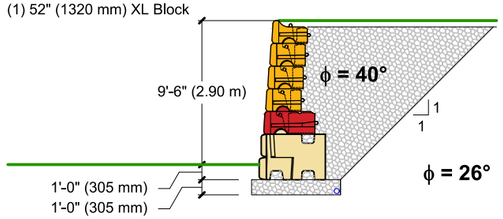
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

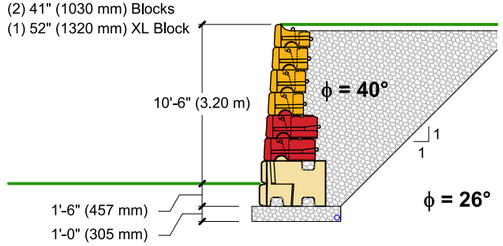
ϕ = 40° over 26° | CRUSHED STONE BACKFILL REPLACING SILTY or CLAYEY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

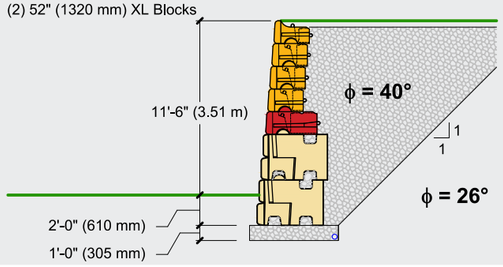
10.5-FOOT (3.20 m) HIGH SECTION
(4) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 52" (1320 mm) XL Block



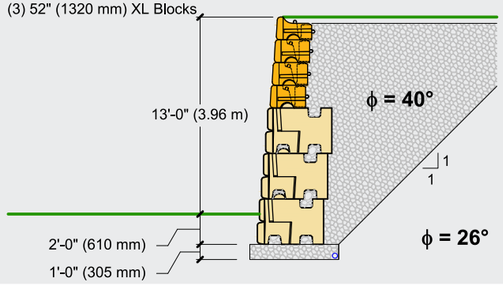
12.0-FOOT (3.66 m) HIGH SECTION
(4) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(1) 52" (1320 mm) XL Block



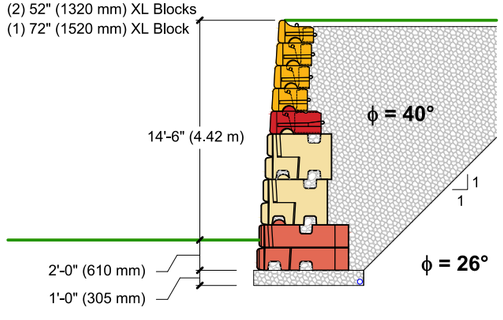
13.5-FOOT (4.11 m) HIGH SECTION
(4) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(2) 52" (1320 mm) XL Blocks



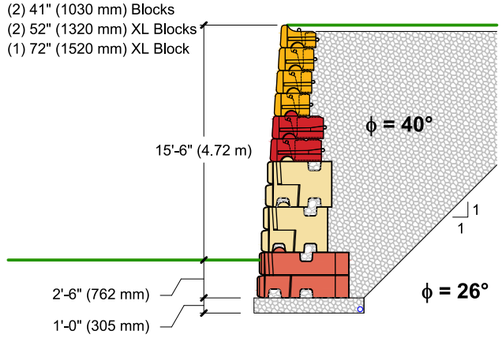
15.0-FOOT (4.57 m) HIGH SECTION
(4) 28" (710 mm) Blocks
(3) 52" (1320 mm) XL Blocks



16.5-FOOT (5.03 m) HIGH SECTION
(4) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(2) 52" (1320 mm) XL Blocks
(1) 72" (1520 mm) XL Block



18.0-FOOT (5.49 m) HIGH SECTION
(4) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(2) 52" (1320 mm) XL Blocks
(1) 72" (1520 mm) XL Block



Legend:

= 28" (710mm) BLOCK
= 41" (1030 mm) BLOCK
= 60" (1520 mm) BLOCK
= 52" (1320 mm) XL BLOCK
= 72" (1830 mm) XL BLOCK
= 96" (2440 mm) XL BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

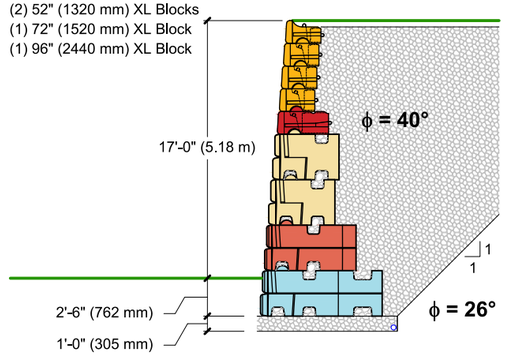
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

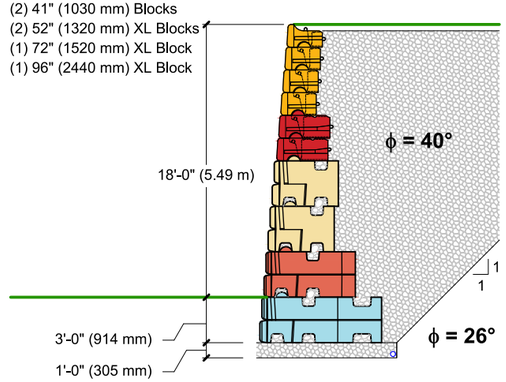
ϕ = 40° over 26° | CRUSHED STONE BACKFILL REPLACING SILTY or CLAYEY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

19.5-FOOT (5.94 m) HIGH SECTION
(4) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(2) 52" (1320 mm) XL Blocks
(1) 72" (1520 mm) XL Block
(1) 96" (2440 mm) XL Block



21.0-FOOT (6.40 m) HIGH SECTION
(4) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(2) 52" (1320 mm) XL Blocks
(1) 72" (1520 mm) XL Block
(1) 96" (2440 mm) XL Block



Legend:

= 28" (710mm) BLOCK
= 41" (1030 mm) BLOCK
= 60" (1520 mm) BLOCK
= 52" (1320 mm) XL BLOCK
= 72" (1830 mm) XL BLOCK
= 96" (2440 mm) XL BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

ALLOWABLE STRESS DESIGN

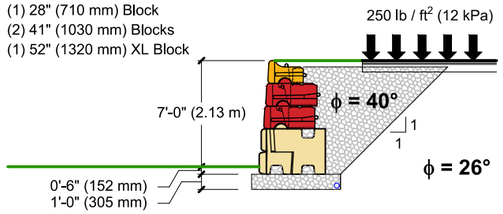
Preliminary Height Guide

ϕ = 40° over 26° | CRUSHED STONE BACKFILL REPLACING SILTY or CLAYEY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

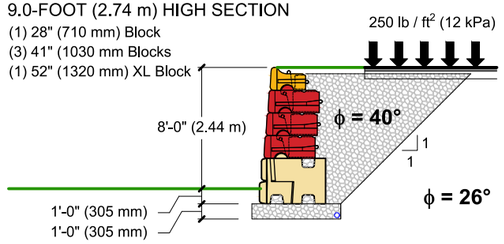
7.5-FOOT (2.29 m) HIGH SECTION

(1) 28" (710 mm) Block
(2) 41" (1030 mm) Blocks
(1) 52" (1320 mm) XL Block



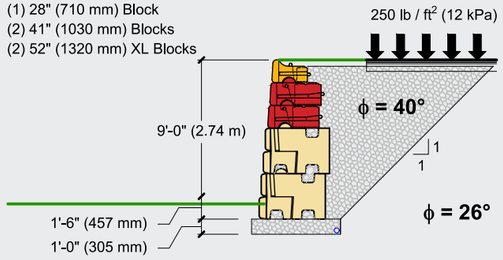
9.0-FOOT (2.74 m) HIGH SECTION

(1) 28" (710 mm) Block
(3) 41" (1030 mm Blocks
(1) 52" (1320 mm) XL Block



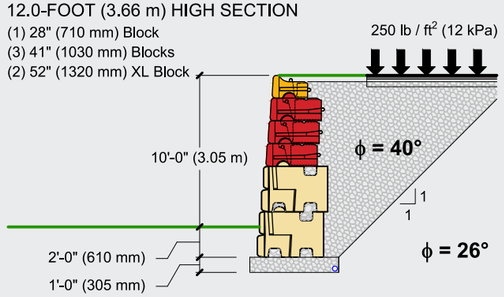
10.5-FOOT (3.20 m) HIGH SECTION

(1) 28" (710 mm) Block
(2) 41" (1030 mm) Blocks
(2) 52" (1320 mm) XL Blocks



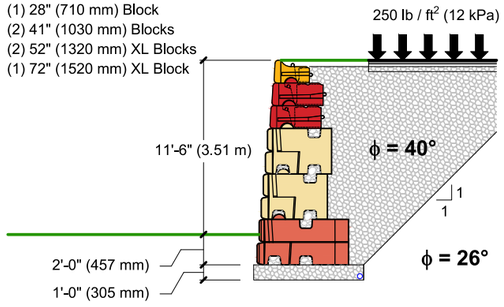
12.0-FOOT (3.66 m) HIGH SECTION

(1) 28" (710 mm) Block
(3) 41" (1030 mm) Blocks
(2) 52" (1320 mm) XL Block



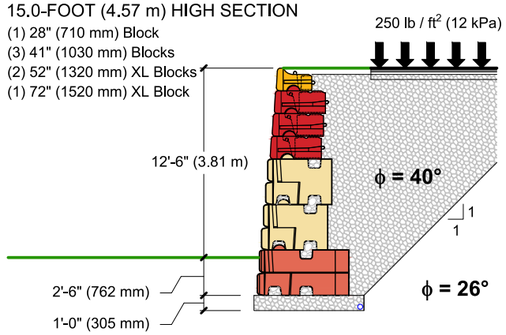
13.5-FOOT (4.11 m) HIGH SECTION

(1) 28" (710 mm) Block
(2) 41" (1030 mm) Blocks
(2) 52" (1320 mm) XL Blocks
(1) 72" (1520 mm) XL Block



15.0-FOOT (4.57 m) HIGH SECTION

(1) 28" (710 mm) Block
(3) 41" (1030 mm) Blocks
(2) 52" (1320 mm) XL Blocks
(1) 72" (1520 mm) XL Block



Legend:

= 28" (710mm) BLOCK
= 41" (1030 mm) BLOCK
= 60" (1520 mm) BLOCK
= 52" (1320 mm) XL BLOCK
= 72" (1830 mm) XL BLOCK
= 96" (2440 mm) XL BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS

ALLOWABLE STRESS DESIGN

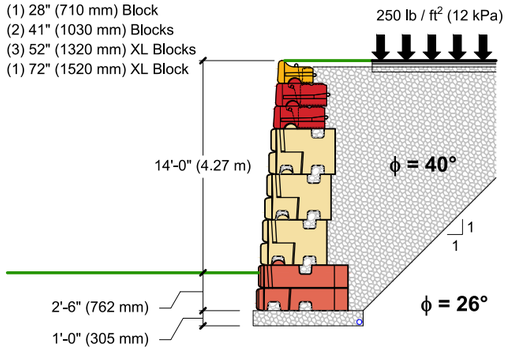
Preliminary Height Guide

ϕ = 40° over 26° | CRUSHED STONE BACKFILL REPLACING SILTY or CLAYEY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

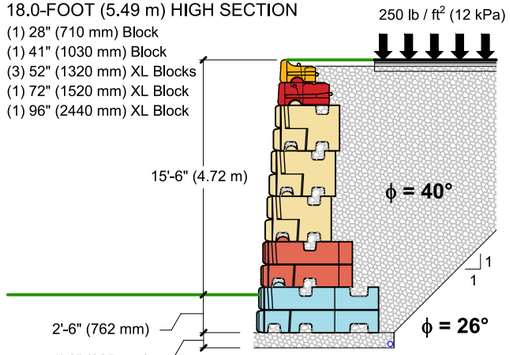
16.5-FOOT (5.03 m) HIGH SECTION

(1) 28" (710 mm) Block
(2) 41" (1030 mm) Blocks
(3) 52" (1320 mm) XL Blocks
(1) 72" (1520 mm) XL Block



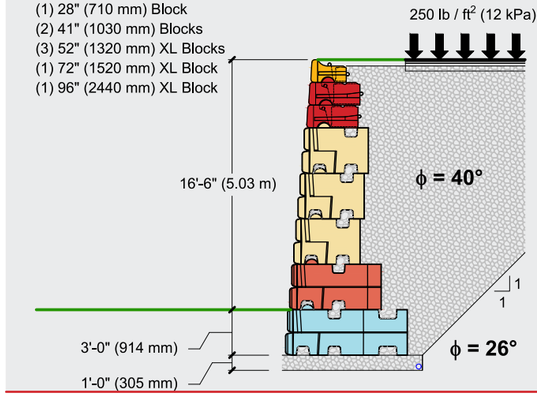
18.0-FOOT (5.49 m) HIGH SECTION

(1) 28" (710 mm) Block
(1) 41" (1030 mm) Block
(3) 52" (1320 mm) XL Blocks
(1) 72" (1520 mm) XL Block
(1) 96" (2440 mm) XL Block



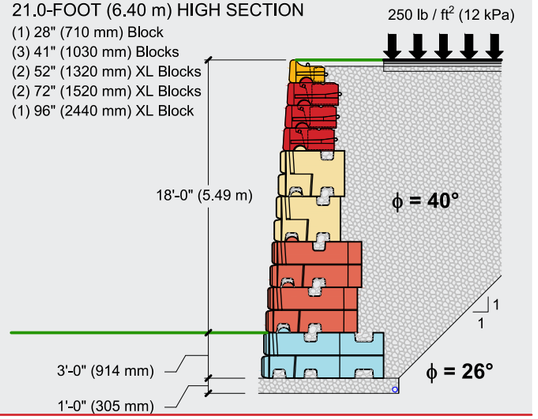
19.5-FOOT (5.94 m) HIGH SECTION

(1) 28" (710 mm) Block
(2) 41" (1030 mm) Blocks
(3) 52" (1320 mm) XL Blocks
(1) 72" (1520 mm) XL Block
(1) 96" (2440 mm) XL Block



21.0-FOOT (6.40 m) HIGH SECTION

(1) 28" (710 mm) Block
(3) 41" (1030 mm) Blocks
(2) 52" (1320 mm) XL Blocks
(2) 72" (1520 mm) XL Blocks
(1) 96" (2440 mm) XL Block



Legend:

= 28" (710mm) BLOCK
= 41" (1030 mm) BLOCK
= 60" (1520 mm) BLOCK
= 52" (1320 mm) XL BLOCK
= 72" (1830 mm) XL BLOCK
= 96" (2440 mm) XL BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

Project: Friday Harbour Project #206 **Owner:** Geranium, et al **Engineer:** SCS Consultants, et al **Installer:** Rocky River Construction, et al
Manufacturer: The Sarjeant Co. **Location:** Innisfil, Ontario, Canada **Completed:** 2017

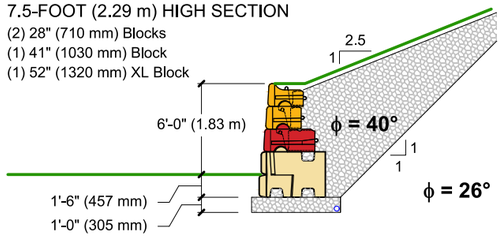
XL HOLLOW-CORE RETAINING BLOCK GRAVITY WALLS ALLOWABLE STRESS DESIGN

Preliminary Height Guide

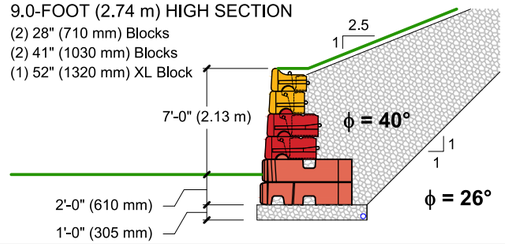
ϕ = 40° over 26° | CRUSHED STONE BACKFILL REPLACING SILTY or CLAYEY SAND

LOAD CONDITION C | 1 : 2.5 BACK SLOPE, NO TOE SLOPE, NO LIVE LOAD SURCHARGE

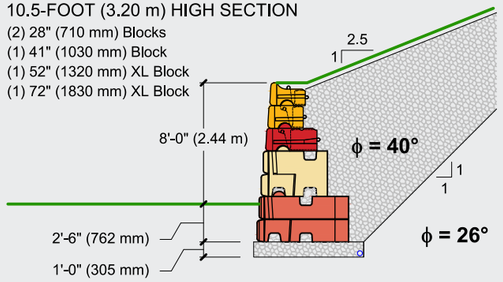
7.5-FOOT (2.29 m) HIGH SECTION
(2) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 52" (1320 mm) XL Block



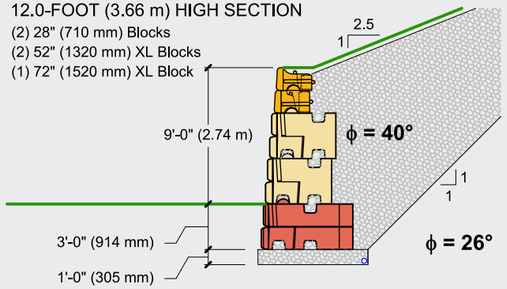
9.0-FOOT (2.74 m) HIGH SECTION
(2) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks
(1) 52" (1320 mm) XL Block



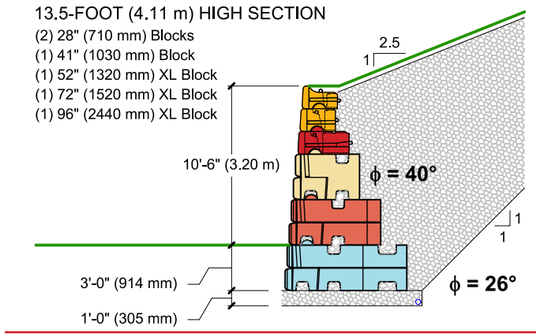
10.5-FOOT (3.20 m) HIGH SECTION
(2) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 52" (1320 mm) XL Block
(1) 72" (1830 mm) XL Block



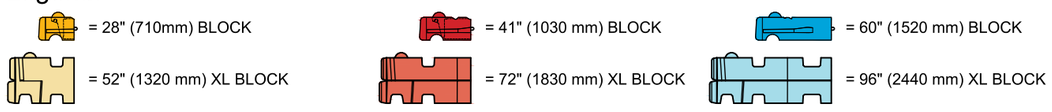
12.0-FOOT (3.66 m) HIGH SECTION
(2) 28" (710 mm) Blocks
(2) 52" (1320 mm) XL Blocks
(1) 72" (1520 mm) XL Block



13.5-FOOT (4.11 m) HIGH SECTION
(2) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block
(1) 52" (1320 mm) XL Block
(1) 72" (1520 mm) XL Block
(1) 96" (2440 mm) XL Block



Legend:



SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

LARGE BATTER WALLS

9” (230 MM) SETBACK WALLS

IMPORTANT NOTICE

The design specifications for Redi-Rock® blocks suggest maximum installation heights under certain assumed conditions. These wall heights were calculated using the assumed material properties and loading conditions in the *Design Resource Manual* and will vary from location to location depending on the soil properties and terrain. Since soil conditions and topography vary greatly from site to site, an engineering analysis must be performed for each wall installation.

Because Redi-Rock International does not build the blocks or install the wall system, Redi-Rock International does not assume any responsibility regarding structural stability of any particular block or particular wall system. In addition, Redi-Rock International assumes no responsibility in connection with any injury, death, or property damage claim whatsoever whether asserted against a Leasee, Leasor, Purchaser or others, arising out of or attributable to the operation of or products produced with Redi-Rock International equipment.

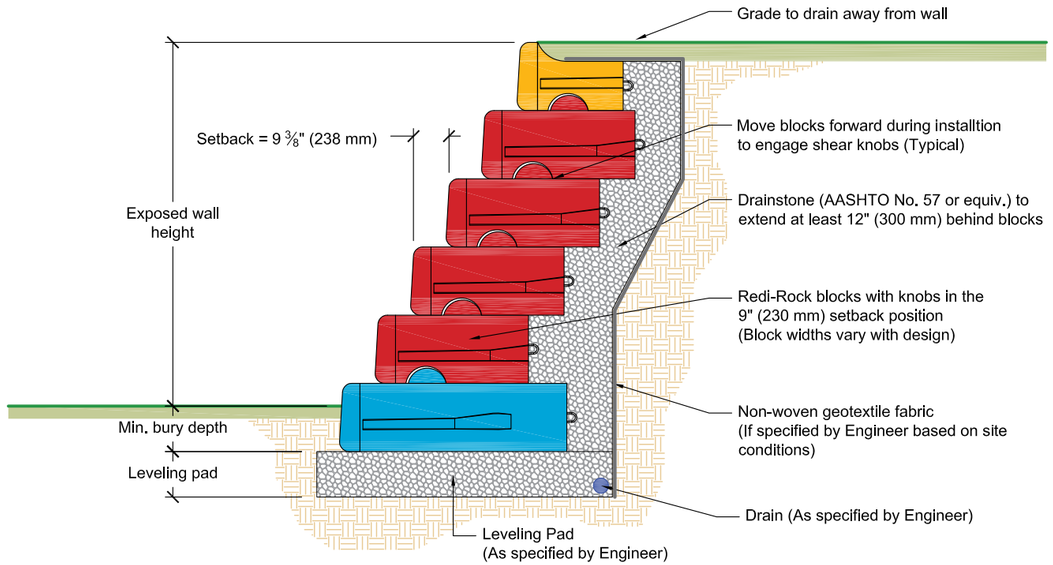
9" (230 mm) SETBACK WALLS

ALLOWABLE STRESS DESIGN

Preliminary Height Guide

This preliminary height guide has been prepared showing Redi-Rock walls in a variety of assumed conditions. It is intended to give the specifier an idea of what block types are required and what heights are achievable with Redi-Rock in different applications. A combination of Redi-Rock 28" (710 mm), 41" (1030 mm), and 60" (1520 mm) wide blocks with knobs in the 9" (230 mm) setback position are used to provide the most efficient cross-section available in the different conditions.

Several assumptions have been made in preparation of the guide. They are listed in the notes below. If these assumptions do not match the wall section under consideration, block selections and achievable heights may vary from the sections shown in this guide. All wall sections for construction must be designed by a registered Professional Engineer using the actual conditions of the site.



Notes:

This preliminary guide has been prepared for three different soil types and three different load conditions to give an indication of the performance of Redi-Rock walls. **Redi-Rock walls are not limited to these conditions.** Specific wall sections can be designed for different soil and loading conditions.

Unit weight of soil is assumed to be 120 lb/ft^3 (18.85 kN/m^3) or 130 lb/ft^3 (20.4 kN/m^3) as noted for each section of this preliminary guide.

Minimum factors of safety are 1.5 for sliding, 1.5 for overturning, 2.0 for bearing capacity, and 1.3 for global stability. Other factors of safety will result in changes from the wall heights and block selections shown in this guide.

No seismic or hydrostatic loads were included in this preliminary guide.

Ledgestone texture blocks were used to prepare this preliminary guide. Achievable wall heights and block selections for other textures may vary.

Independent barrier design at the top of the wall must be performed for site-specific conditions. Barrier requirements may result in changes to available wall heights and block selections from those shown in this guide.

Wall stability needs to be verified in the final design for site specific conditions.

The wall design shall address both internal and external drainage and shall be evaluated by the Professional Engineer who is responsible for the final wall design.

Backfill material to be compacted to 90% modified proctor density (ASTM D1557).

All Redi-Rock International Wall System Specifications and installation recommendations should be followed.

Construction oversight should be provided on all walls to ensure proper construction according to your detailed design drawings.

Not tall enough? Greater wall heights are achievable with select backfill and/or mechanically stabilized earth Redi-Rock walls.

Redi-Rock products are manufactured by independently owned, licensed manufacturers. Product offerings will vary between manufacturers. Contact your local manufacturer to determine what products are available for your job.

These block selection and height guides were prepared by Redi-Rock International for estimating and conceptual design purposes only. All information is believed to be true and accurate; however, Redi-Rock International assumes no responsibility for the use of these preliminary guides for actual construction. Determination of the suitability of each preliminary guide is the sole responsibility of the user. **Final designs for construction purposes must be performed by a registered Professional Engineer, using the actual conditions of the proposed site.**

9" (230 mm) SETBACK WALLS

ALLOWABLE STRESS DESIGN

Preliminary Height Guide

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

Large batter gravity walls	SECTION 1 OF 3
Assumed retained and foundation soils for this Section	SW, GW
Internal angle of friction	ϕ = 34°
Unit weight	γ = 130 lb / ft^3 (20.4 kN / m^3)
Cohesion	c = 0 lb / ft^2 (0 kPa)

9" (230 mm) SETBACK WALLS

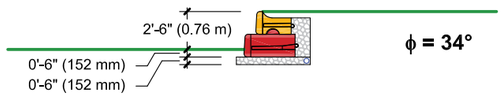
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

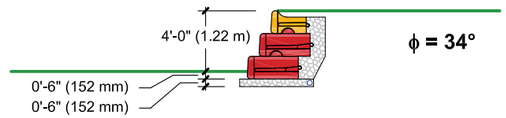
ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

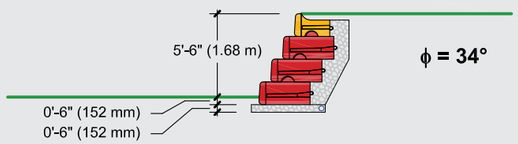
2 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(1) 41" (1030 mm) Block



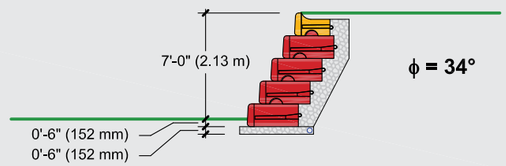
3 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(2) 41" (1030 mm) Blocks



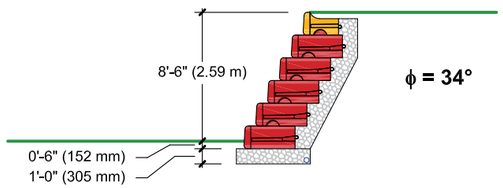
4 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(3) 41" (1030 mm) Blocks



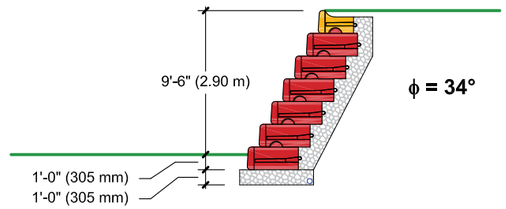
5 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(4) 41" (1030 mm) Blocks



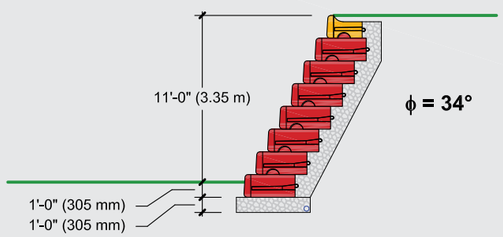
6 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(5) 41" (1030 mm) Blocks



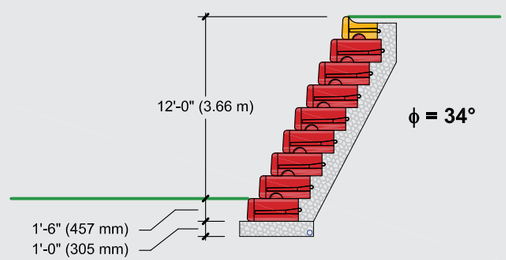
7 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(6) 41" (1030 mm) Blocks



8 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(7) 41" (1030 mm) Blocks



9 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(8) 41" (1030 mm) Blocks



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK

= 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

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9" (230 mm) SETBACK WALLS

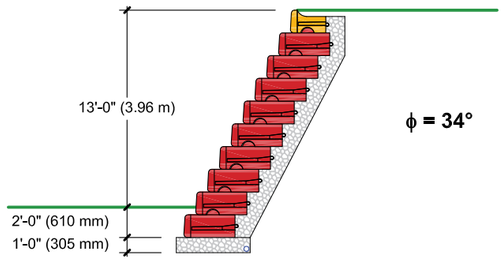
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

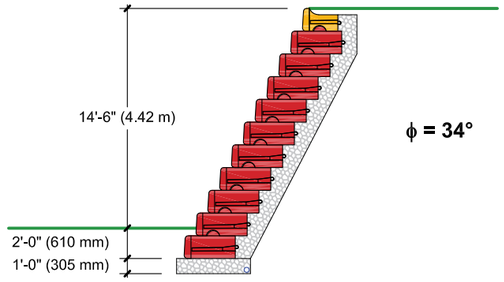
ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

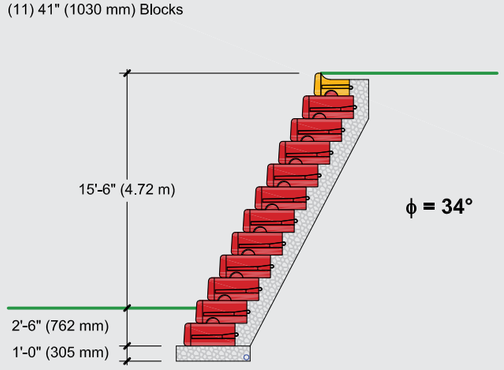
10 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(9) 41" (1030 mm) Blocks



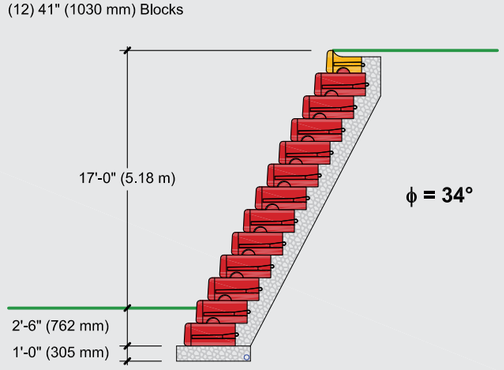
11 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(10) 41" (1030 mm) Blocks



12 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(11) 41" (1030 mm) Blocks



13 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(12) 41" (1030 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

9" (230 mm) SETBACK WALLS

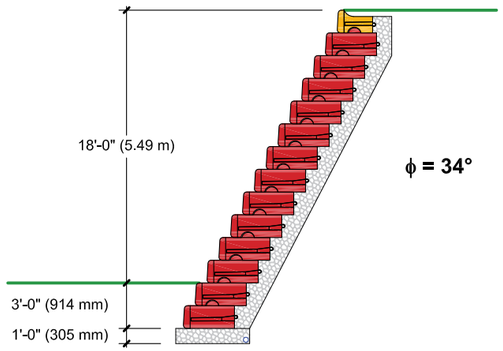
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

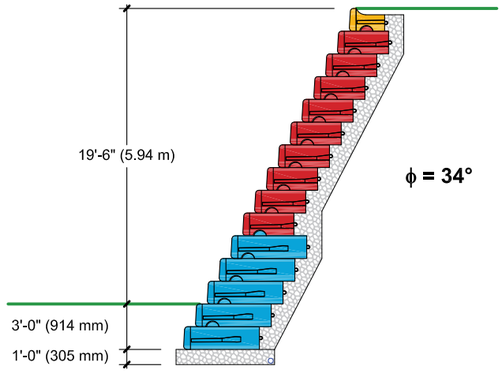
ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

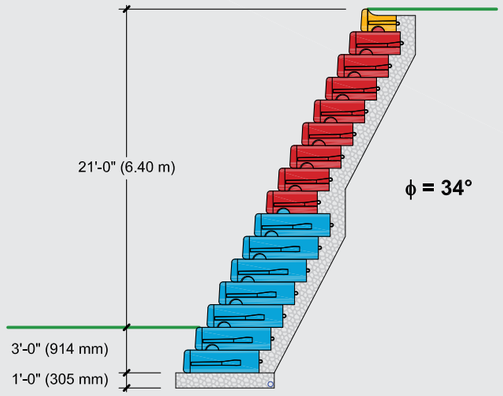
14 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(13) 41" (1030 mm) Blocks



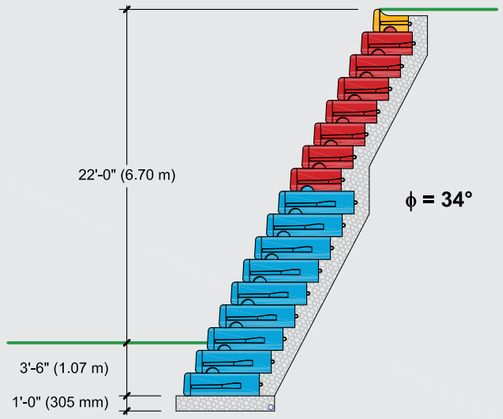
15 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(9) 41" (1030 mm) Blocks
(5) 60" (1520 mm) Blocks



16 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(8) 41" (1030 mm) Blocks
(7) 60" (1520 mm) Blocks



17 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(7) 41" (1030 mm) Blocks
(9) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

9" (230 mm) SETBACK WALLS

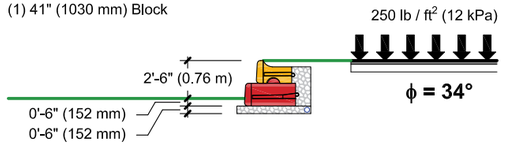
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

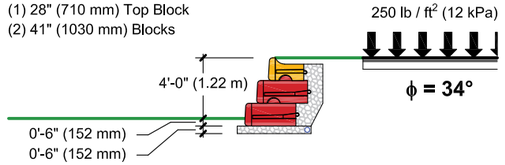
ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

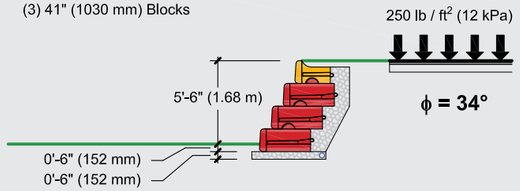
2 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(1) 41" (1030 mm) Block



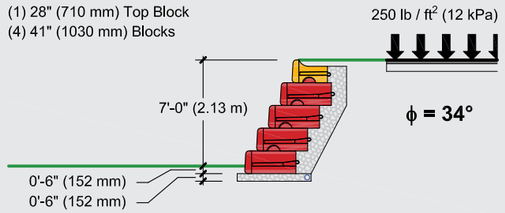
3 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(2) 41" (1030 mm) Blocks



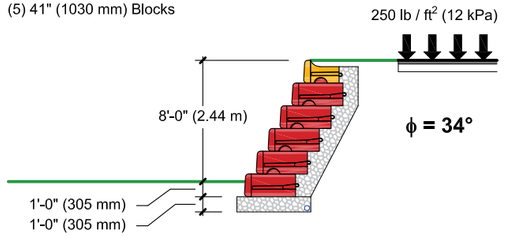
4 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(3) 41" (1030 mm) Blocks



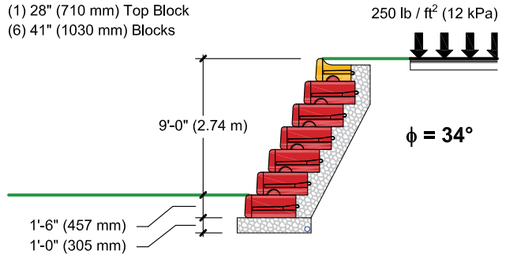
5 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(4) 41" (1030 mm) Blocks



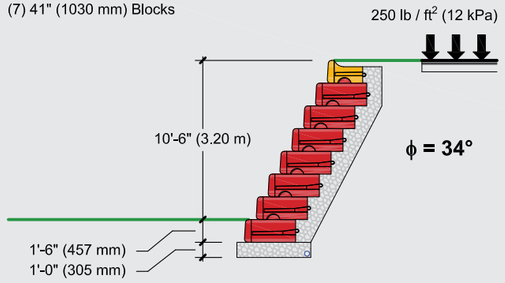
6 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(5) 41" (1030 mm) Blocks



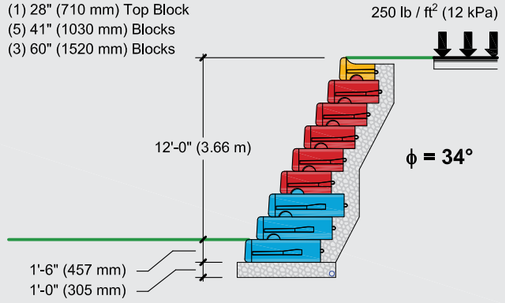
7 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(6) 41" (1030 mm) Blocks



8 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(7) 41" (1030 mm) Blocks



9 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(5) 41" (1030 mm) Blocks
(3) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

9" (230 mm) SETBACK WALLS

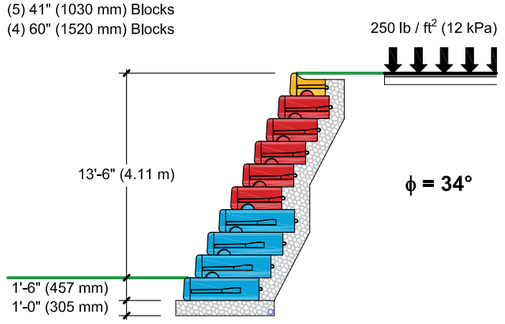
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

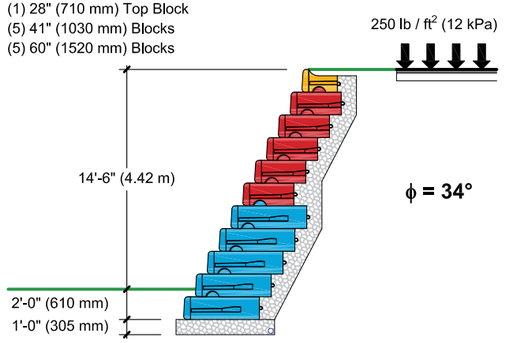
ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

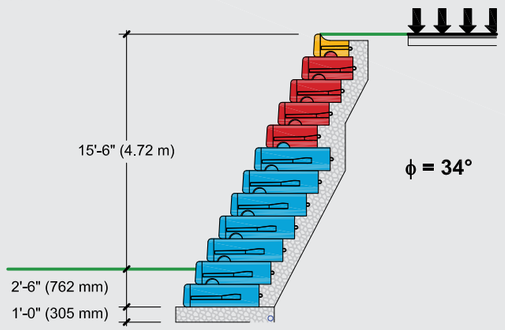
10 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(5) 41" (1030 mm) Blocks
(4) 60" (1520 mm) Blocks



11 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(5) 41" (1030 mm) Blocks
(5) 60" (1520 mm) Blocks



12 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(4) 41" (1030 mm) Blocks
(7) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

9" (230 mm) SETBACK WALLS

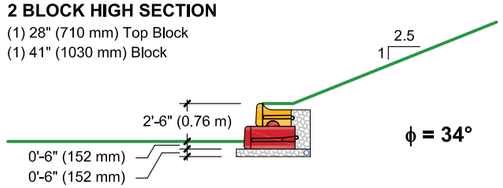
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

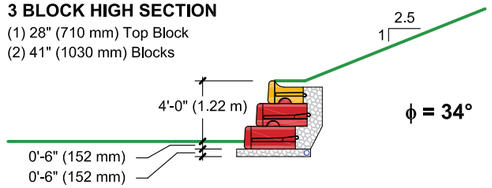
ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION C | 1 : 2.5 BACK SLOPE, NO TOE SLOPE, NO LIVE LOAD SURCHARGE

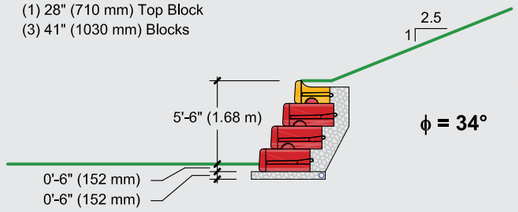
2 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(1) 41" (1030 mm) Block



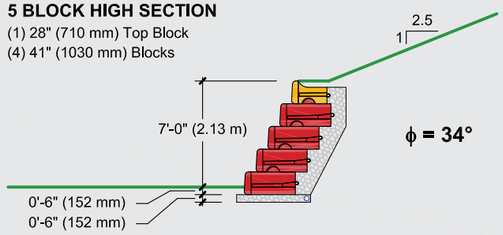
3 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(2) 41" (1030 mm) Blocks



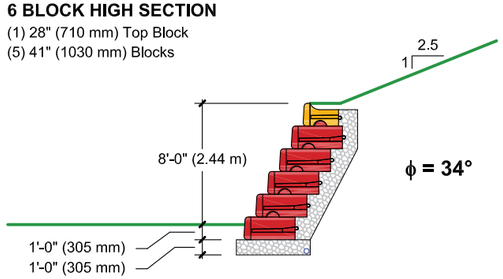
4 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(3) 41" (1030 mm) Blocks



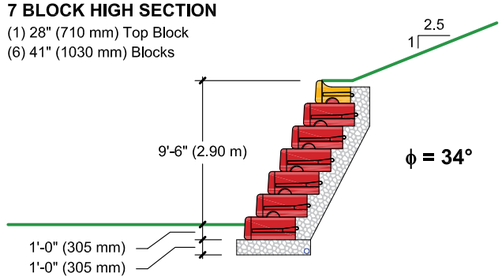
5 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(4) 41" (1030 mm) Blocks



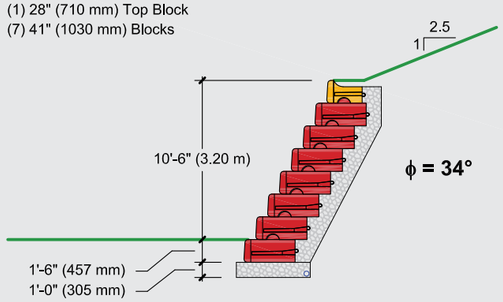
6 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(5) 41" (1030 mm) Blocks



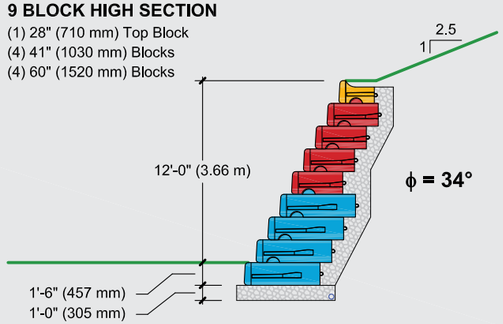
7 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(6) 41" (1030 mm) Blocks



8 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(7) 41" (1030 mm) Blocks



9 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(4) 41" (1030 mm) Blocks
(4) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

9" (230 mm) SETBACK WALLS

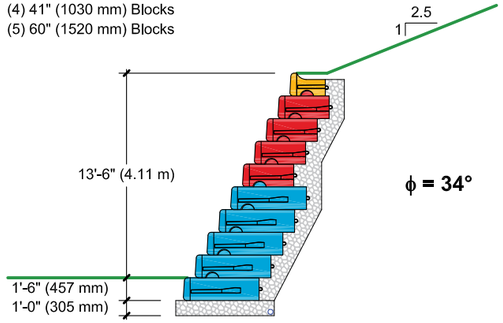
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION C | 1 : 2.5 BACK SLOPE, NO TOE SLOPE, NO LIVE LOAD SURCHARGE

10 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(4) 41" (1030 mm) Blocks
(5) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

9" (230 mm) SETBACK WALLS

ALLOWABLE STRESS DESIGN

Preliminary Height Guide

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

Large batter gravity walls	SECTION 2 OF 3
Assumed retained and foundation soils for this Section	SW, SP, SM
Internal angle of friction	ϕ = 30°
Unit weight	γ = 120 lb / ft^3 (18.8 kN / m^3)
Cohesion	c = 0 lb / ft^2 (0 kPa)

9" (230 mm) SETBACK WALLS

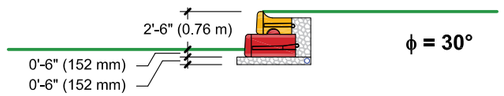
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

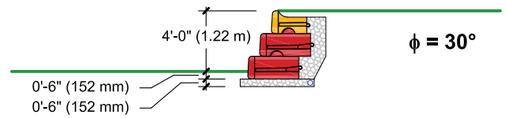
ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

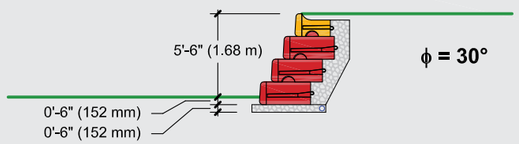
2 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(1) 41" (1030 mm) Block



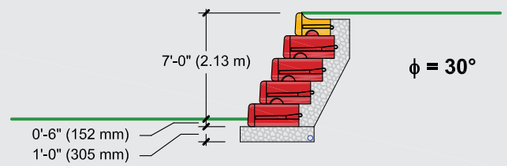
3 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(2) 41" (1030 mm) Blocks



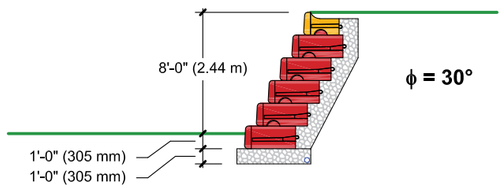
4 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(3) 41" (1030 mm) Blocks



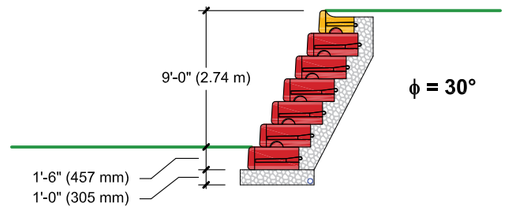
5 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(4) 41" (1030 mm) Blocks



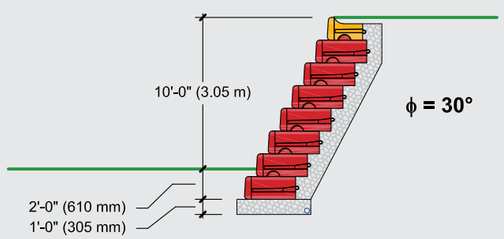
6 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(5) 41" (1030 mm) Blocks



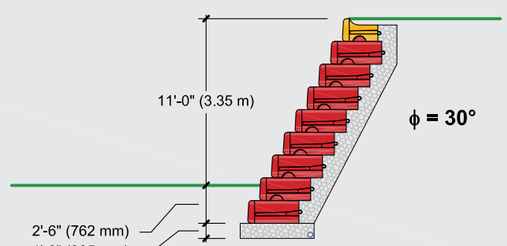
7 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(6) 41" (1030 mm) Blocks



8 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(7) 41" (1030 mm) Blocks



9 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(8) 41" (1030 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

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9" (230 mm) SETBACK WALLS

ALLOWABLE STRESS DESIGN

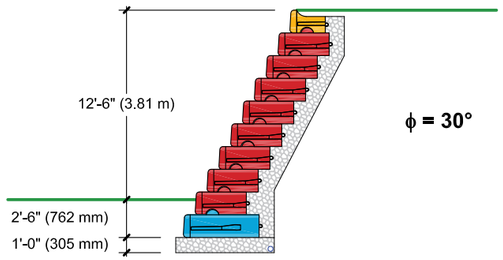
Preliminary Height Guide

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

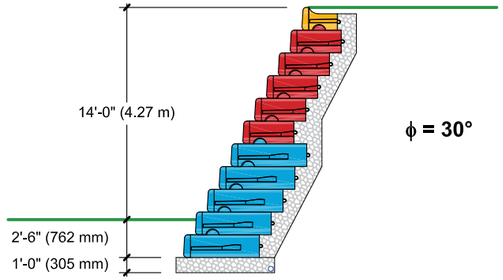
10 BLOCK HIGH SECTION

(1) 28" (710 mm) Top Block
(8) 41" (1030 mm) Blocks
(1) 60" (1520 mm) Block



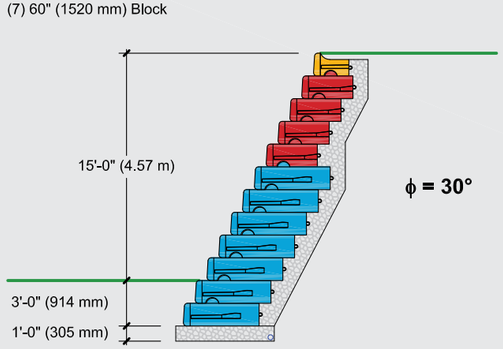
11 BLOCK HIGH SECTION

(1) 28" (710 mm) Top Block
(5) 41" (1030 mm) Blocks
(5) 60" (1520 mm) Block



12 BLOCK HIGH SECTION

(1) 28" (710 mm) Top Block
(4) 41" (1030 mm) Blocks
(7) 60" (1520 mm) Block



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

9" (230 mm) SETBACK WALLS

ALLOWABLE STRESS DESIGN

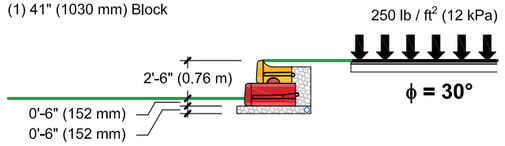
Preliminary Height Guide

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

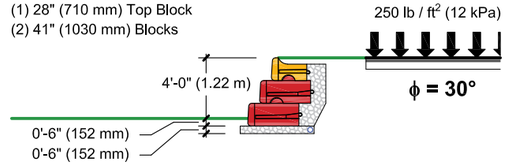
2 BLOCK HIGH SECTION

(1) 28" (710 mm) Top Block
(1) 41" (1030 mm) Block



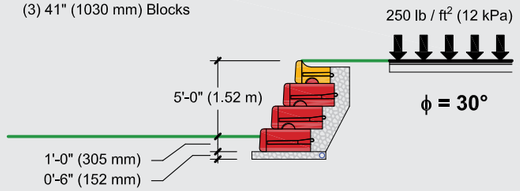
3 BLOCK HIGH SECTION

(1) 28" (710 mm) Top Block
(2) 41" (1030 mm) Blocks



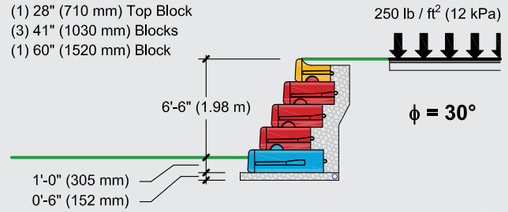
4 BLOCK HIGH SECTION

(1) 28" (710 mm) Top Block
(3) 41" (1030 mm) Blocks



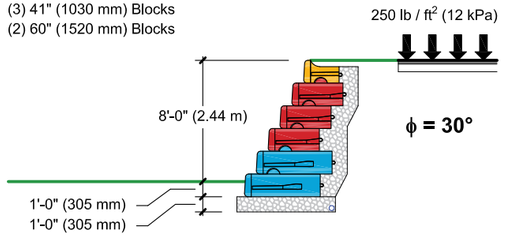
5 BLOCK HIGH SECTION

(1) 28" (710 mm) Top Block
(3) 41" (1030 mm) Blocks
(1) 60" (1520 mm) Block



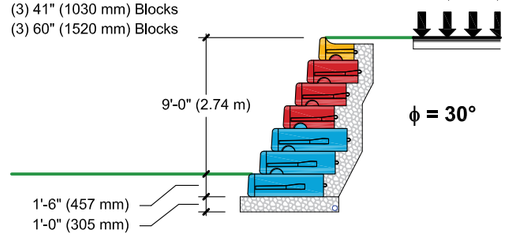
6 BLOCK HIGH SECTION

(1) 28" (710 mm) Top Block
(3) 41" (1030 mm) Blocks
(2) 60" (1520 mm) Blocks



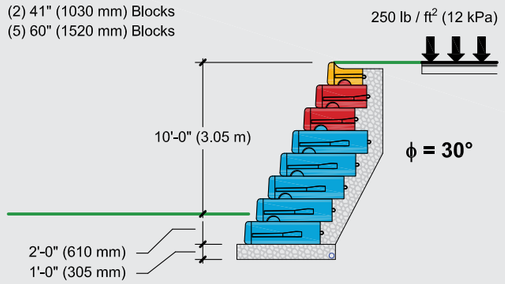
7 BLOCK HIGH SECTION

(1) 28" (710 mm) Top Block
(3) 41" (1030 mm) Blocks
(3) 60" (1520 mm) Blocks



8 BLOCK HIGH SECTION

(1) 28" (710 mm) Top Block
(2) 41" (1030 mm) Blocks
(5) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

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9" (230 mm) SETBACK WALLS

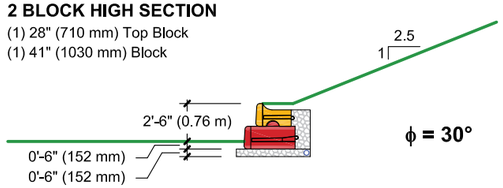
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

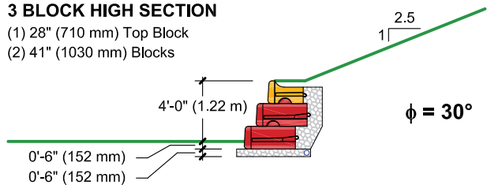
ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION C | 1 : 2.5 BACK SLOPE, NO TOE SLOPE, NO LIVE LOAD SURCHARGE

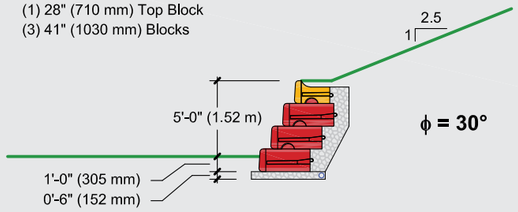
2 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(1) 41" (1030 mm) Block



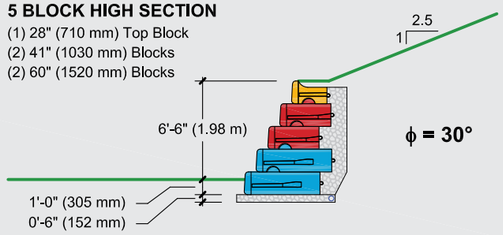
3 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(2) 41" (1030 mm) Blocks



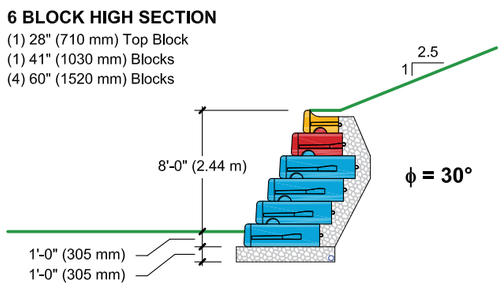
4 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(3) 41" (1030 mm) Blocks



5 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(2) 41" (1030 mm) Blocks
(2) 60" (1520 mm) Blocks



6 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(1) 41" (1030 mm) Blocks
(4) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

9" (230 mm) SETBACK WALLS

ALLOWABLE STRESS DESIGN

Preliminary Height Guide

ϕ = 28° | SILTY SAND or CLAYEY SAND

Large batter gravity walls	SECTION 3 OF 3
Assumed retained and foundation soils for this Section	SM, SC
Internal angle of friction	ϕ = 28°
Unit weight	γ = 120 lb / ft^3 (18.8 kN / m^3)
Cohesion	c = 0 lb / ft^2 (0 kPa)

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9" (230 mm) SETBACK WALLS

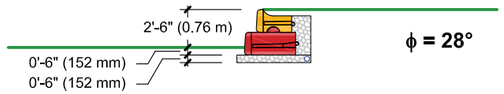
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

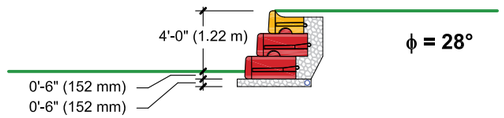
ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

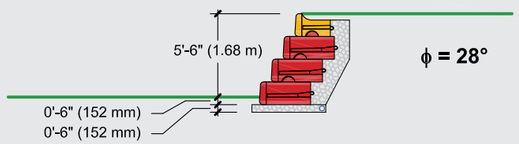
2 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(1) 41" (1030 mm) Block



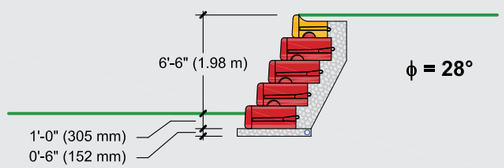
3 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(2) 41" (1030 mm) Blocks



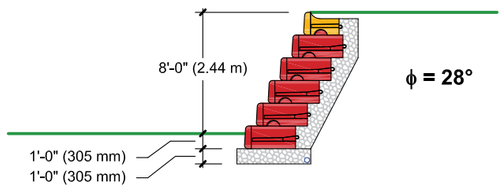
4 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(3) 41" (1030 mm) Blocks



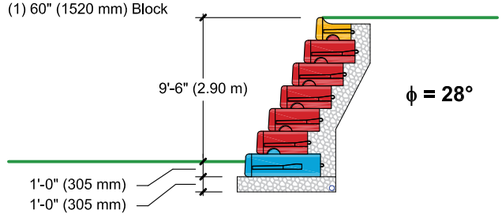
5 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(4) 41" (1030 mm) Blocks



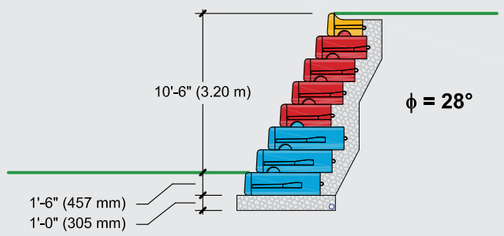
6 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(5) 41" (1030 mm) Blocks



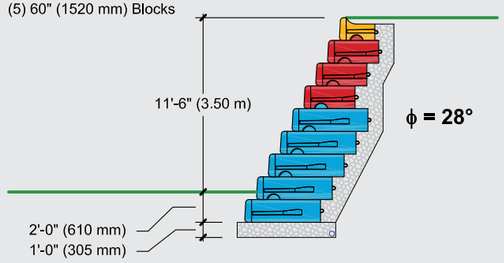
7 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(5) 41" (1030 mm) Blocks
(1) 60" (1520 mm) Block



8 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(4) 41" (1030 mm) Blocks
(3) 60" (1520 mm) Blocks



9 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(3) 41" (1030 mm) Blocks
(5) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

9" (230 mm) SETBACK WALLS

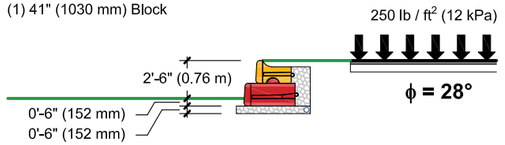
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

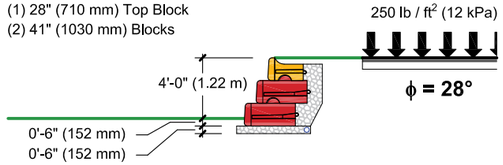
ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

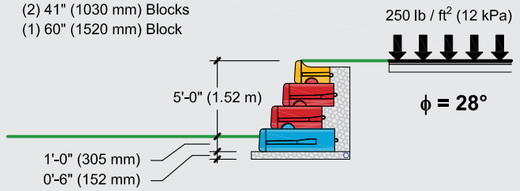
2 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(1) 41" (1030 mm) Block



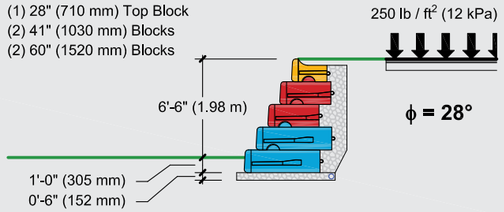
3 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(2) 41" (1030 mm) Blocks



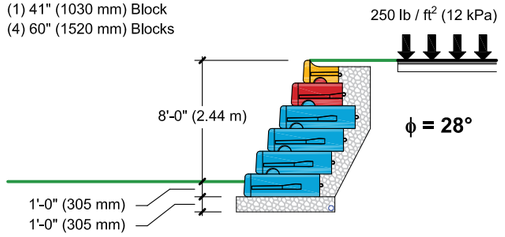
4 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(2) 41" (1030 mm) Blocks
(1) 60" (1520 mm) Block



5 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(2) 41" (1030 mm) Blocks
(2) 60" (1520 mm) Blocks



6 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(1) 41" (1030 mm) Block
(4) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK = 41" (1030 mm) BLOCK = 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

9" (230 mm) SETBACK WALLS

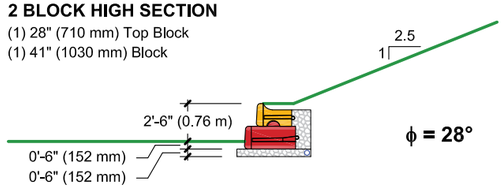
ALLOWABLE STRESS DESIGN

Preliminary Height Guide

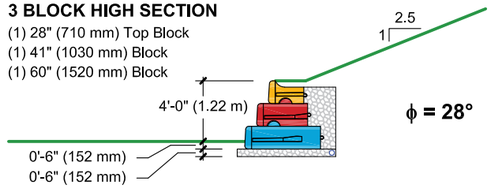
ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION C | 1 : 2.5 BACK SLOPE, NO TOE SLOPE, NO LIVE LOAD SURCHARGE

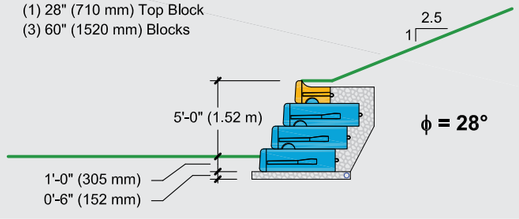
2 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(1) 41" (1030 mm) Block



3 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(1) 41" (1030 mm) Block
(1) 60" (1520 mm) Block



4 BLOCK HIGH SECTION
(1) 28" (710 mm) Top Block
(3) 60" (1520 mm) Blocks



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK

= 60" (1520 mm) BLOCK

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIMINARY HEIGHT GUIDE.

Project: Residential Erosion Protection ***Block Manufacturer:*** MDC Contracting, LLC ***Engineer:*** Benchmark Engineering ***Installer:*** Harbor Springs Excavating ***Location:*** Harbor Springs, Michigan ***Completed:*** 2008

MSE WALLS

POSITIVE CONNECTION SYSTEM WALLS

IMPORTANT NOTICE

The design specifications for Redi-Rock® blocks suggest maximum installation heights under certain assumed conditions. These wall heights were calculated using the assumed material properties and loading conditions in the *Design Resource Manual* and will vary from location to location depending on the soil properties and terrain. Since soil conditions and topography vary greatly from site to site, an engineering analysis must be performed for each wall installation.

Because Redi-Rock International does not build the blocks or install the wall system, Redi-Rock International does not assume any responsibility regarding structural stability of any particular block or particular wall system. In addition, Redi-Rock International assumes no responsibility in connection with any injury, death, or property damage claim whatsoever whether asserted against a Leasee, Leasor, Purchaser or others, arising out of or attributable to the operation of or products produced with Redi-Rock International equipment.

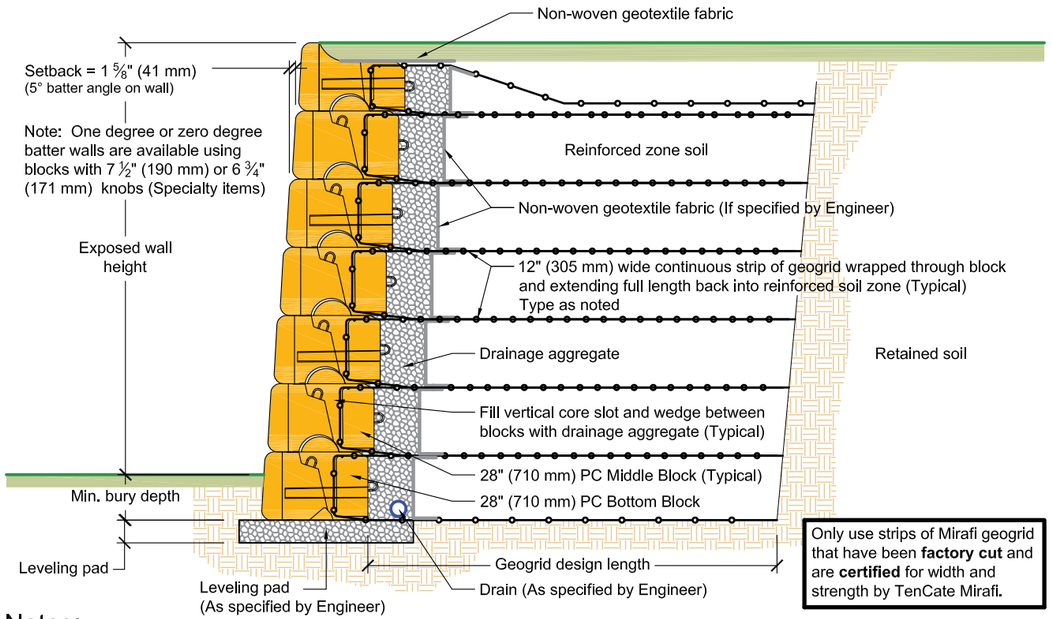
POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

This preliminary reinforcement schedule has been prepared showing Redi-Rock Mechanically Stabilized Earth (MSE) walls in a variety of assumed conditions. It is intended to give the specifier an idea of what types and lengths of geogrid reinforcement are required to achieve various wall heights in different applications. Redi-Rock 28" (710 mm) wide Positive Connection (PC) System blocks and 12" (305 mm) strips of Mirafi Geogrid are used.

Several assumptions have been made in preparation of the guide. They are listed in the notes below. If these assumptions do not match the wall section under consideration, types and lengths of geogrid reinforcement will vary from what is shown in this guide. All wall sections for construction must be designed by a registered Professional Engineer using the actual conditions of the site.



Notes:

This preliminary reinforcement schedule has been prepared for three different soil types and three different load conditions to demonstrate the type and length of geogrid soil reinforcement needed to construct Redi-Rock PC System MSE walls. **Redi-Rock walls are not limited to these conditions.** Specific wall sections can be designed for different soil and loading conditions.

Unit weight of soil is assumed to be 120 lb/ft^3 (18.85 kN/m^3) or 130 lb/ft^3 (20.4 kN/m^3) as noted for each section of this guide.

Design calculations are in general accordance with *AASHTO LRFD Bridge Design Specifications, Customary, 6th Edition* (2012). Load combinations are per AASHTO Table 3.4.1-1. Load factors are per AASHTO Table 3.4.1-2. Resistance factors are per AASHTO Table 11.5.7-1 and Sections 11.5.7, 11.5.8, and 11.6.2.3.

This preliminary reinforcement schedule demonstrates geogrid requirements for the soil types as shown. Some agencies may require select backfill material for use in the reinforced soil zone that differ from the material assumed in this guide. Actual geogrid requirements for construction may vary from those shown in this guide depending on site-specific soil parameters.

No seismic or hydrostatic loads were included in this preliminary guide.

Independent barrier design at the top of the wall must be performed for site-specific conditions. Barrier requirements may result in changes to the geogrid reinforcement types and lengths from those shown in this guide.

Wall stability needs to be verified in the final design for site-specific conditions.

The wall design shall address both internal and external drainage and shall be evaluated by the Professional Engineer who is responsible for the final wall design.

Backfill material to be compacted to 90% modified proctor density (ASTM D1557).

All Redi-Rock International Wall System Specifications and installation recommendations should be followed.

Construction oversight should be provided on all walls to ensure proper construction according to your detailed design drawings.

Redi-Rock products are manufactured by independently owned, licensed manufacturers. Product offerings will vary between manufacturers. Contact your local manufacturer to determine what products are available for your job.

These block selection and height guides were prepared by Redi-Rock International for estimating and conceptual design purposes only. All information is believed to be true and accurate; however, Redi-Rock International assumes no responsibility for the use of these preliminary guides for actual construction. Determination of the suitability of each preliminary guide is the sole responsibility of the user. **Final designs for construction purposes must be performed by a registered Professional Engineer, using the actual conditions of the proposed site.**

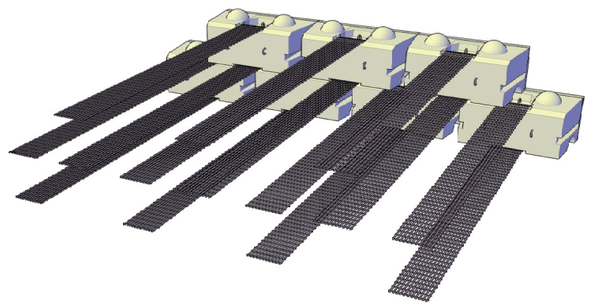
POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

Positive Connection System MSE Walls	SECTION 1 OF 3
Assumed reinforced zone, retained, and foundation soils for this Section	SW, GW
Internal angle of friction	ϕ = 34°
Unit weight	γ = 130 lb / ft^3 (20.4 kN / m^3)
Cohesion	c = 0 lb / ft^2 (0 kPa)



POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

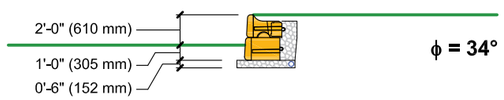
Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

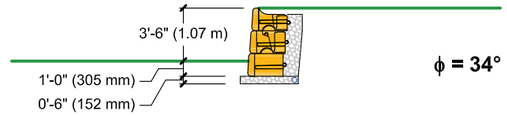
2 BLOCK SECTION
(2) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
No Geogrid Needed		



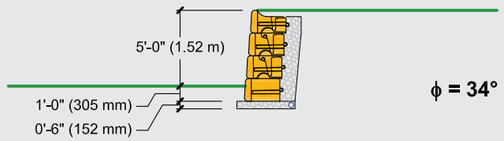
3 BLOCK SECTION
(3) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
No Geogrid Needed		



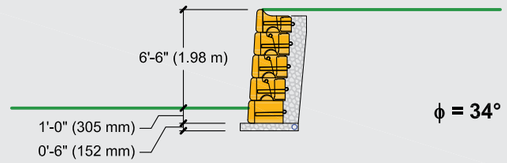
4 BLOCK SECTION
(4) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
No Geogrid Needed		



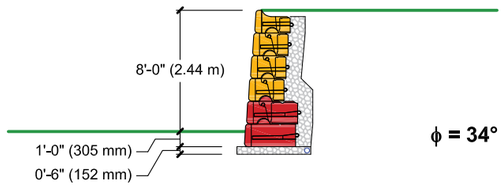
5 BLOCK SECTION
(5) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
No Geogrid Needed		



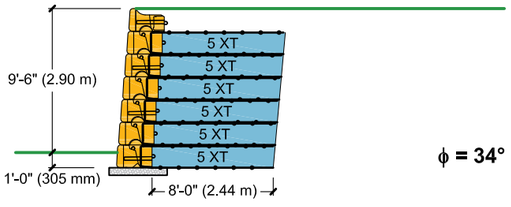
6 BLOCK SECTION
(4) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
No Geogrid Needed		



7 BLOCK SECTION
(7) 28" (710 mm) Blocks

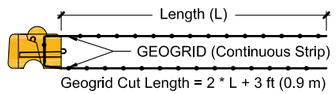
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.16	± 0.51



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

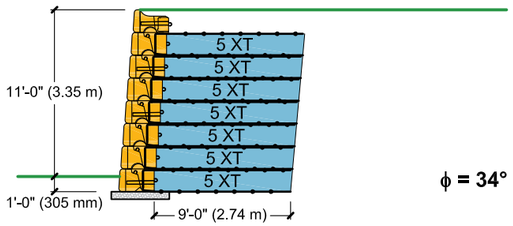
Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

8 BLOCK SECTION
(8) 28" (710 mm) Blocks

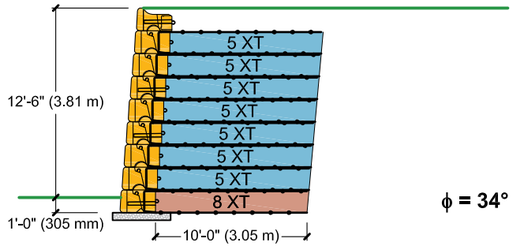
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.20	± 0.66



ϕ = 34°

9 BLOCK SECTION
(9) 28" (710 mm) Blocks

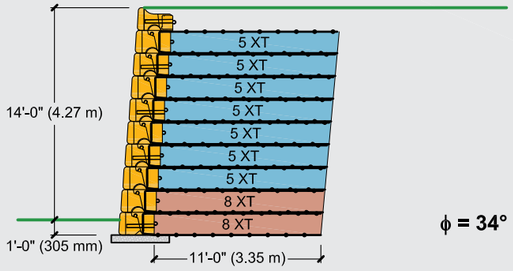
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.23	± 0.75
8XT	± 0.03	± 0.11



ϕ = 34°

10 BLOCK SECTION
(10) 28" (710 mm) Blocks

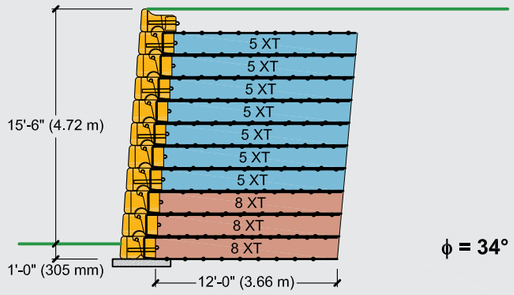
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.23	± 0.75
8XT	± 0.07	± 0.21



ϕ = 34°

11 BLOCK SECTION
(11) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
8XT	± 0.11	± 0.37

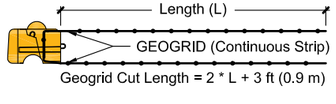


ϕ = 34°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

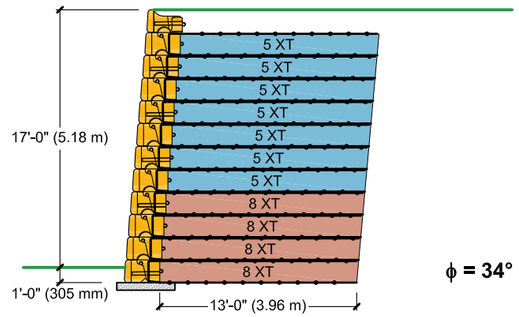
Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

12 BLOCK SECTION
(12) 28" (710 mm) Blocks

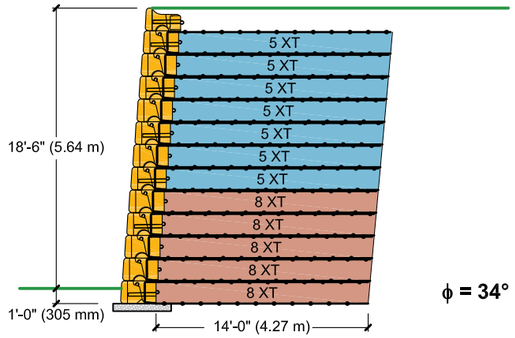
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.30	± 1.00
8XT	± 0.17	± 0.57



ϕ = 34°

13 BLOCK SECTION
(13) 28" (710 mm) Blocks

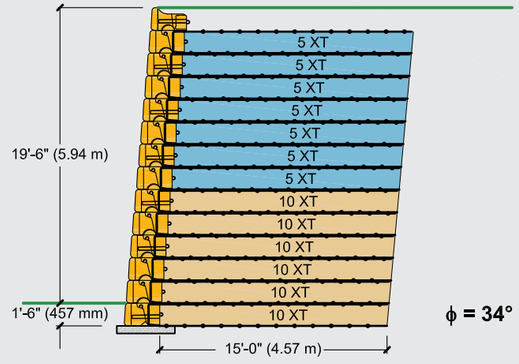
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.30	± 1.00
8XT	± 0.22	± 0.71



ϕ = 34°

14 BLOCK SECTION
(14) 28" (710 mm) Blocks

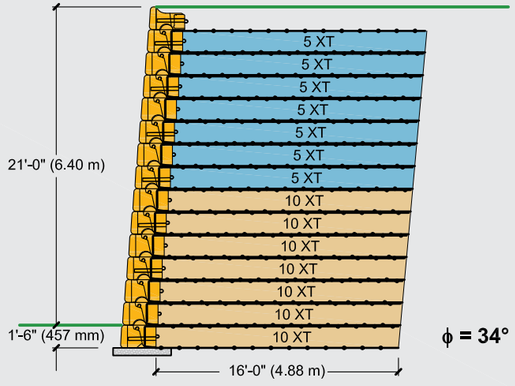
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.30	± 1.00
10XT	± 0.26	± 0.85



ϕ = 34°

15 BLOCK SECTION
(15) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.36	± 1.19
10XT	± 0.36	± 1.19

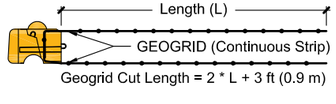


ϕ = 34°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

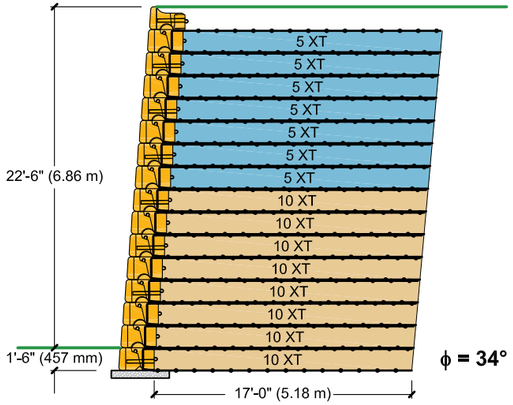
Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

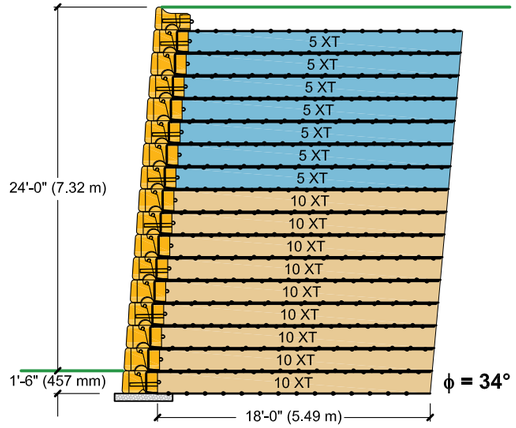
16 BLOCK SECTION
(16) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.36	± 1.19
10XT	± 0.42	± 1.37



17 BLOCK SECTION
(17) 28" (710 mm) Blocks

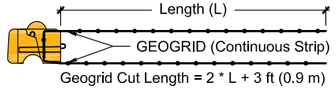
Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.36	± 1.19
10XT	± 0.47	± 1.54



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

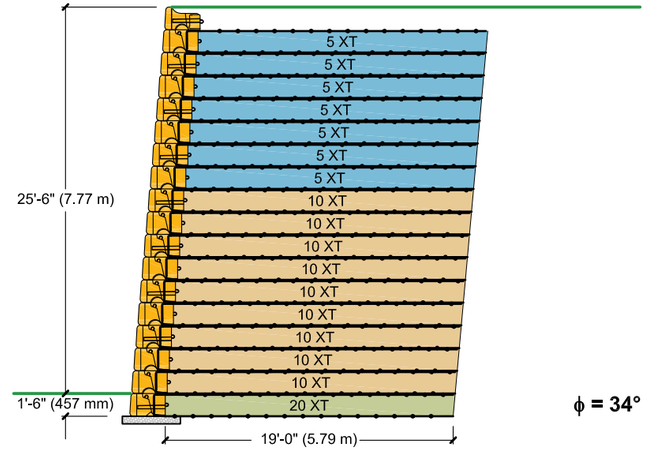
Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

18 BLOCK SECTION
(18) 28" (710 mm) Blocks

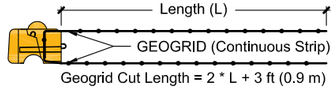
Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.46	± 1.49
10XT	± 0.59	± 1.92
20XT	± 0.07	± 0.21



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

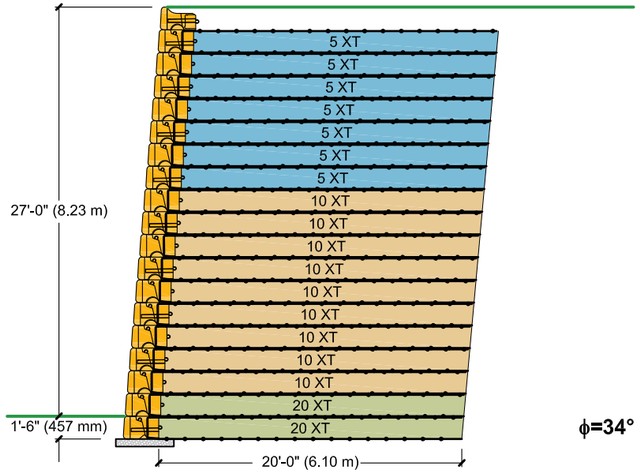
Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

19 BLOCK SECTION
(19) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.46	± 1.49
10XT	± 0.59	± 1.92
20XT	± 0.13	± 0.43

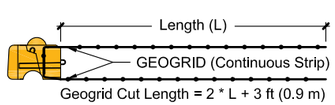


ϕ=34°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

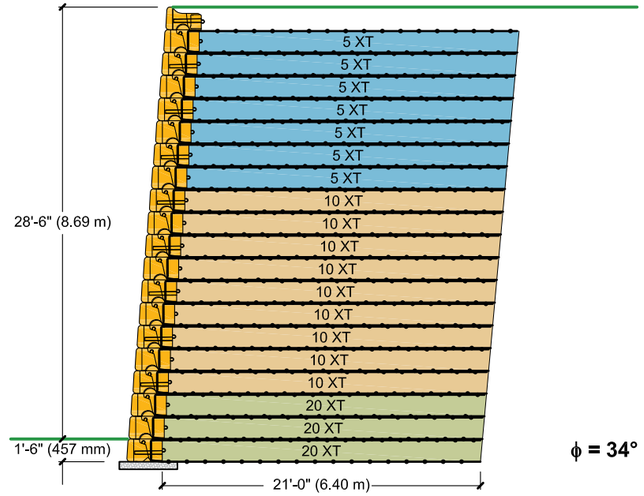
Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

20 BLOCK SECTION *
(20) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.46	± 1.49
10XT	± 0.59	± 1.92
20XT	± 0.20	± 0.64

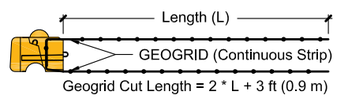


ϕ = 34°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Not tall enough? You can build significantly taller walls with the Redi-Rock PC System...we just had to stop the preliminary sections somewhere. Talk to your Engineer or give us a call for more info.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

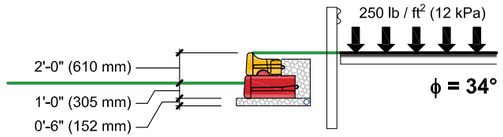
ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

2 BLOCK SECTION

(1) 28" (710 mm) Block
(1) 41" (1030 mm) Block

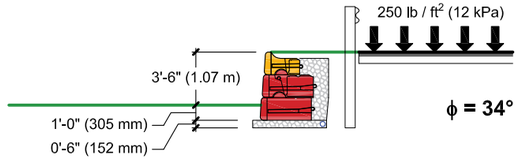
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
No Geogrid Needed		



3 BLOCK SECTION

(1) 28" (710 mm) Block
(2) 41" (1030 mm) Blocks

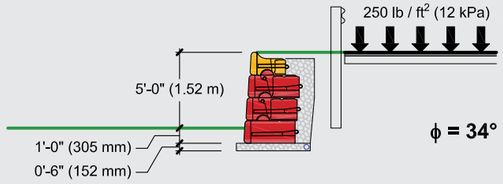
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
No Geogrid Needed		



4 BLOCK SECTION

(1) 28" (710 mm) Block
(3) 41" (1030 mm) Blocks

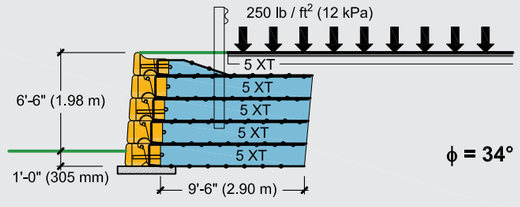
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
No Geogrid Needed		



5 BLOCK SECTION

(5) 28" (710 mm) Blocks

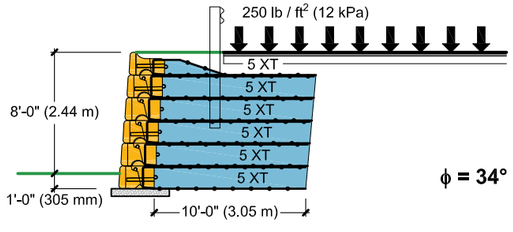
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.14	± 0.47



6 BLOCK SECTION

(6) 28" (710 mm) Blocks

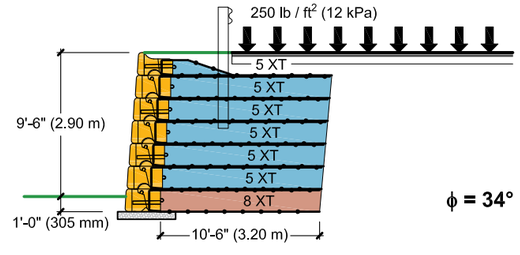
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.20	± 0.64



7 BLOCK SECTION

(7) 28" (710 mm) Blocks

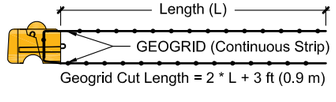
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.20	± 0.64
8XT	± 0.03	± 0.11



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

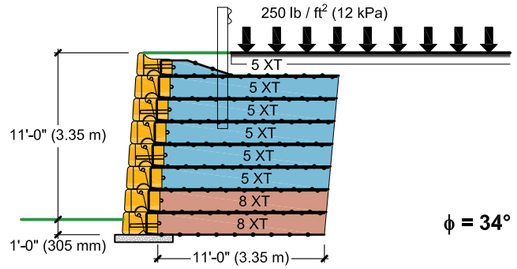
ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

8 BLOCK SECTION

(8) 28" (710 mm) Blocks

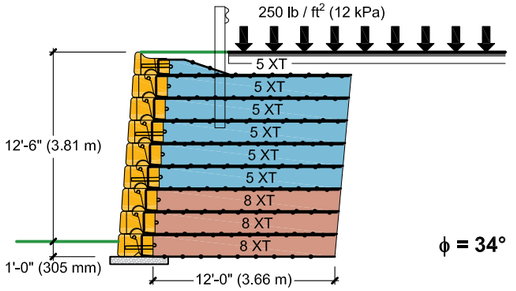
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.20	± 0.64
8XT	± 0.07	± 0.21



9 BLOCK SECTION

(9) 28" (710 mm) Blocks

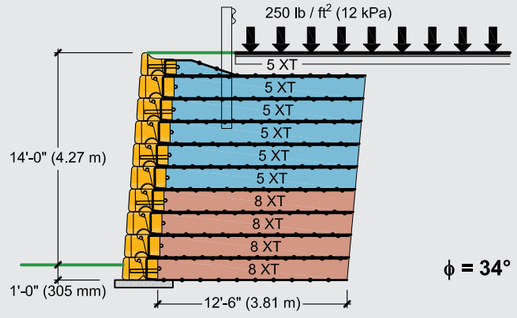
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.22	± 0.73
8XT	± 0.11	± 0.37



10 BLOCK SECTION

(10) 28" (710 mm) Blocks

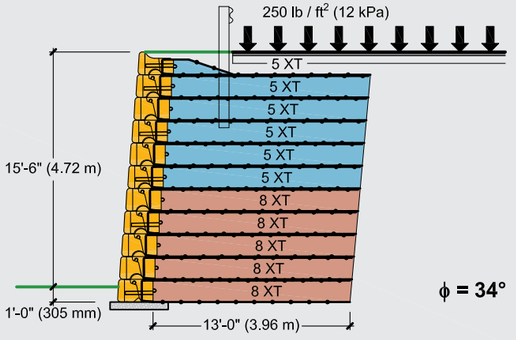
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.22	± 0.73
8XT	± 0.15	± 0.49



11 BLOCK SECTION

(11) 28" (710 mm) Blocks

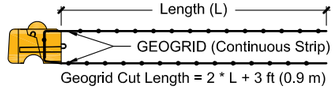
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
8XT	± 0.22	± 0.71



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

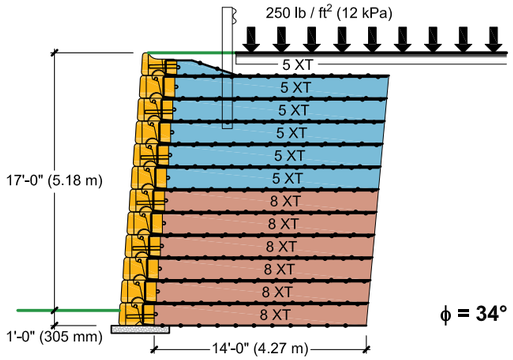
Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

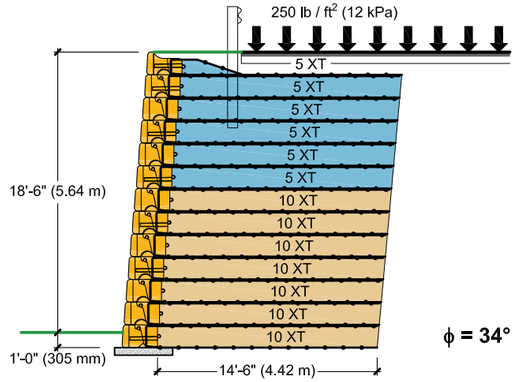
12 BLOCK SECTION
(12) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
8XT	± 0.26	± 0.85



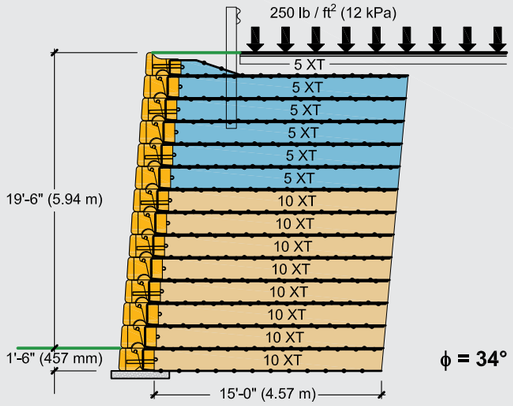
13 BLOCK SECTION
(13) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
10XT	± 0.30	± 1.00



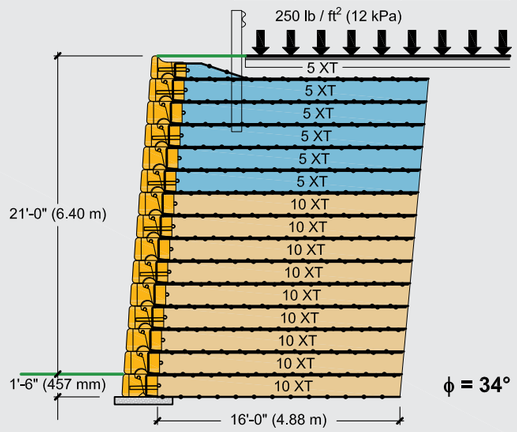
14 BLOCK SECTION
(14) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
10XT	± 0.35	± 1.14



15 BLOCK SECTION
(15) 28" (710 mm) Blocks

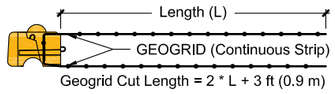
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.31	± 1.02
10XT	± 0.47	± 1.54



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

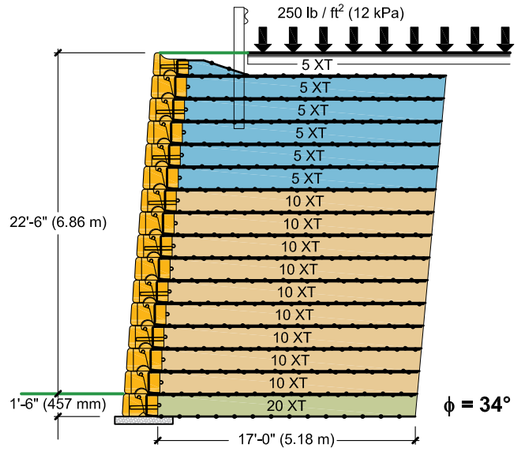
Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

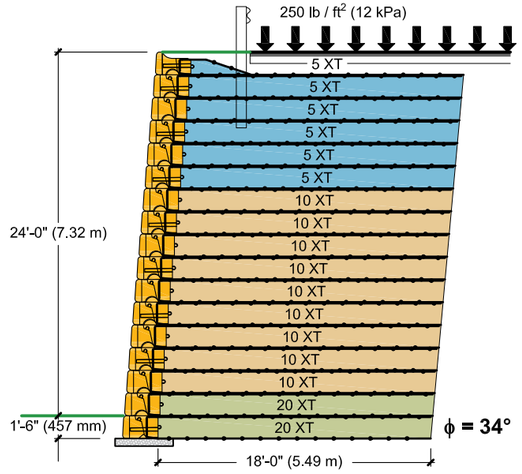
16 BLOCK SECTION
(16) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.31	± 1.02
10XT	± 0.47	± 1.54
20XT	± 0.05	± 0.17



17 BLOCK SECTION
(17) 28" (710 mm) Blocks

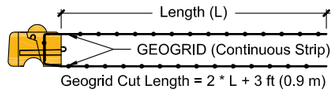
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.31	± 1.02
10XT	± 0.47	± 1.54
20XT	± 0.10	± 0.34



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

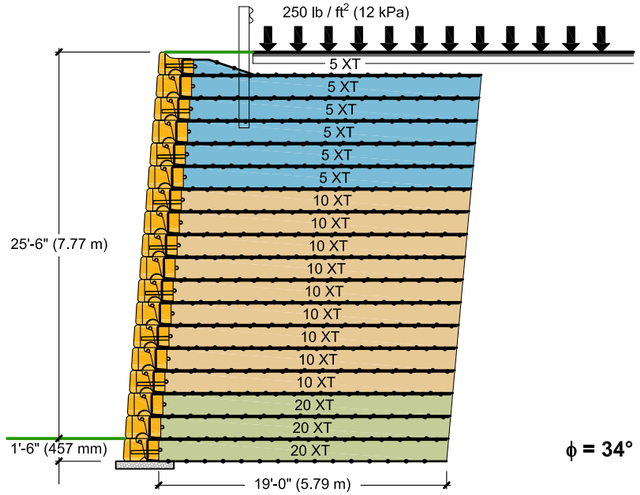
Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

18 BLOCK SECTION
(18) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.39	± 1.28
10XT	± 0.59	± 1.92
20XT	± 0.20	± 0.64

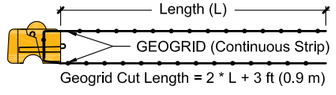


ϕ = 34°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

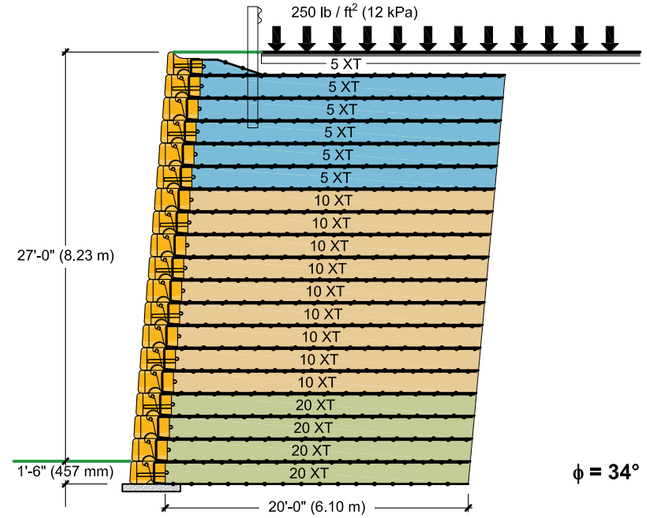
Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

19 BLOCK SECTION
(19) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.39	± 1.28
10XT	± 0.59	± 1.92
20XT	± 0.26	± 0.85

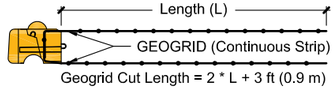


ϕ = 34°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

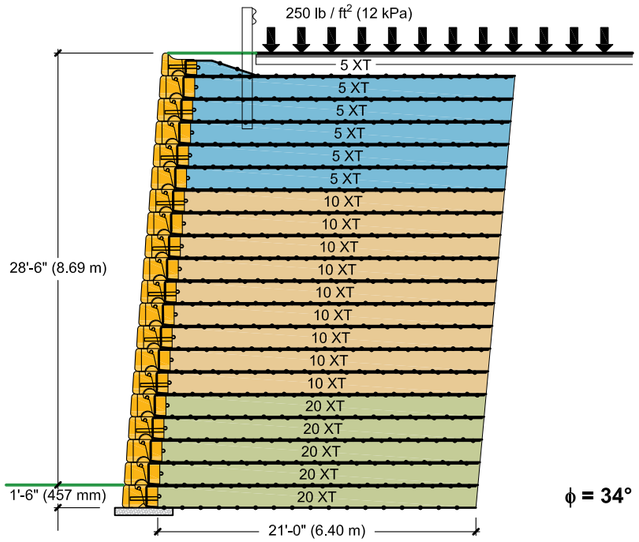
Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

20 BLOCK SECTION *
(20) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.39	± 1.28
10XT	± 0.59	± 1.92
20XT	± 0.33	± 1.07

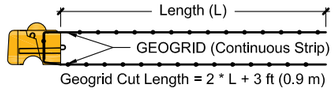


ϕ = 34°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Not tall enough? You can build significantly taller walls with the Redi-Rock PC System...we just had to stop the preliminary sections somewhere. Talk to your Engineer or give us a call for more info.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

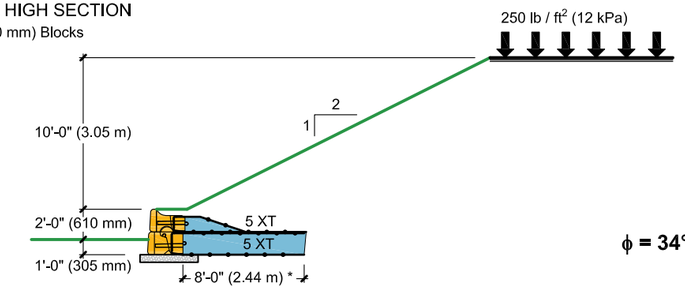
Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

2 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks

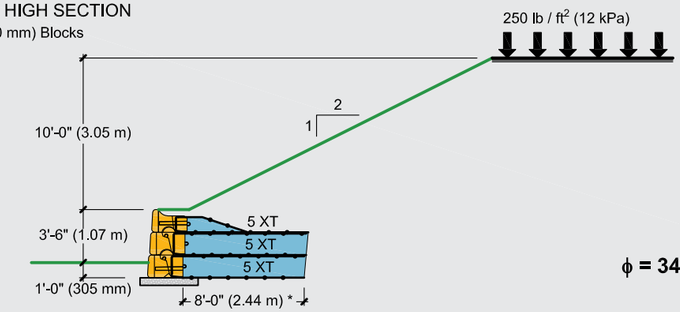
Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.05	± 0.17



ϕ = 34°

3 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks

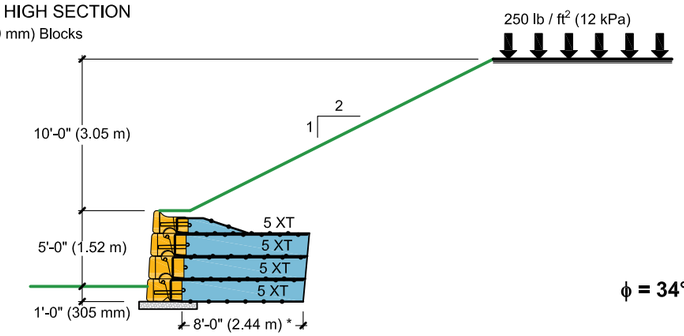
Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.08	± 0.26



ϕ = 34°

4 BLOCK HIGH SECTION
(4) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.10	± 0.34

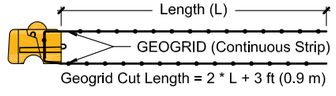


ϕ = 34°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

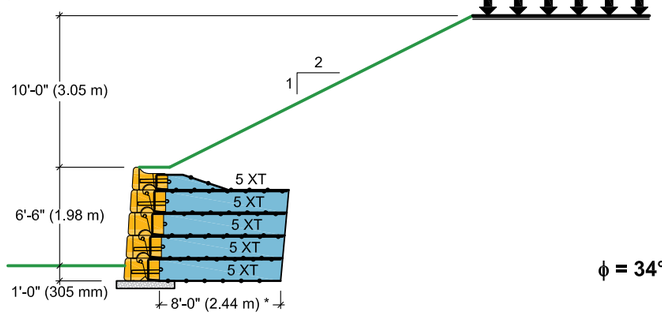
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

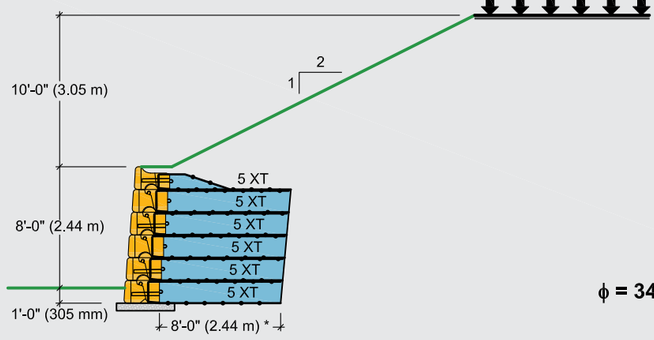
5 BLOCK HIGH SECTION
(5) 28" (710 mm) Blocks



Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.13	± 0.43

ϕ = 34°

6 BLOCK HIGH SECTION
(6) 28" (710 mm) Blocks



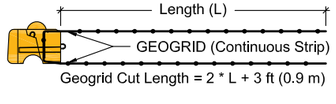
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.16	± 0.51

ϕ = 34°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

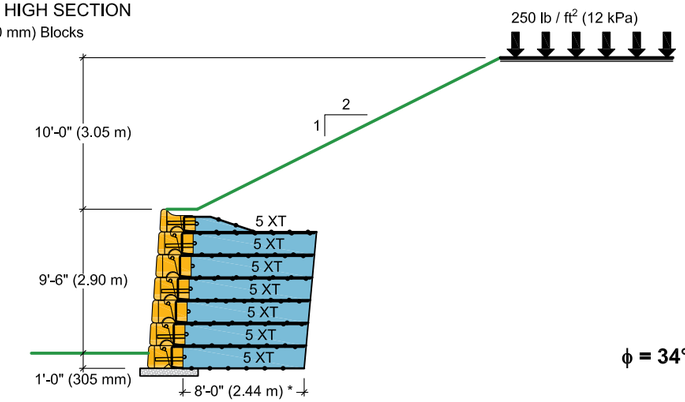
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

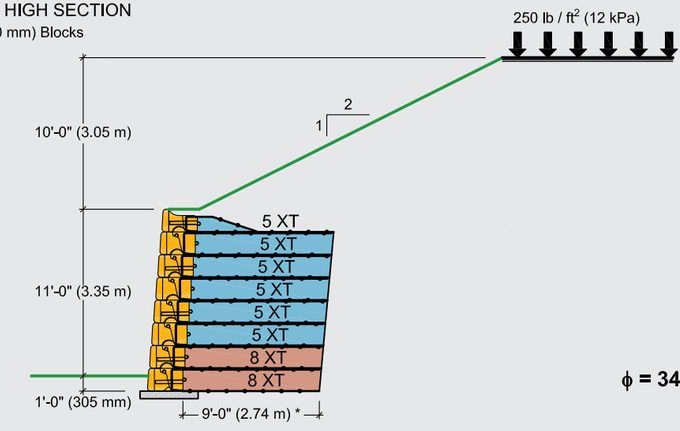
7 BLOCK HIGH SECTION
(7) 28" (710 mm) Blocks



Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.18	± 0.60

ϕ = 34°

8 BLOCK HIGH SECTION
(8) 28" (710 mm) Blocks



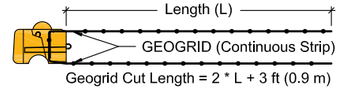
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.17	± 0.57
8XT	± 0.06	± 0.19

ϕ = 34°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

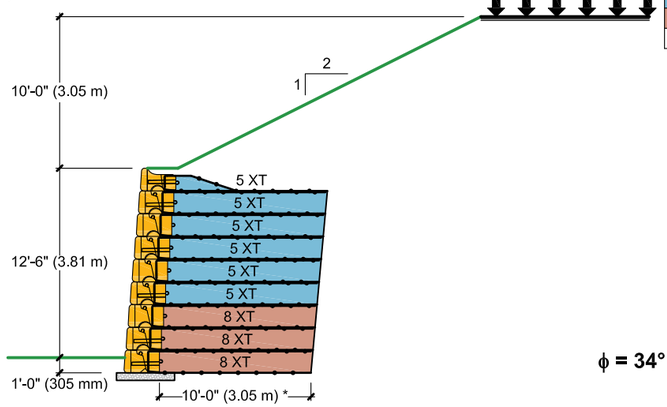
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

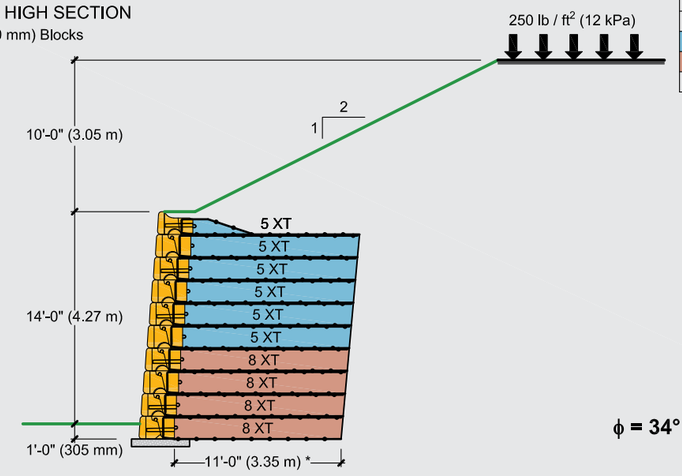
9 BLOCK HIGH SECTION
(9) 28" (710 mm) Blocks



ϕ = 34°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.20	± 0.64
8XT	± 0.10	± 0.32

10 BLOCK HIGH SECTION
(10) 28" (710 mm) Blocks



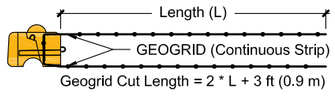
ϕ = 34°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.20	± 0.64
8XT	± 0.13	± 0.43

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

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POSITIVE CONNECTION SYSTEM WALLS

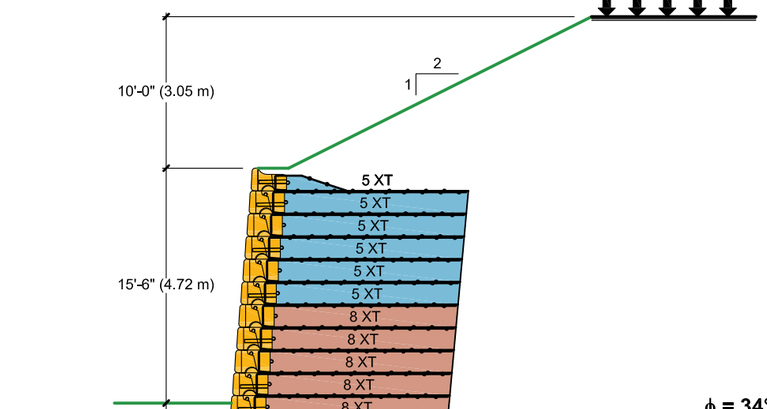
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

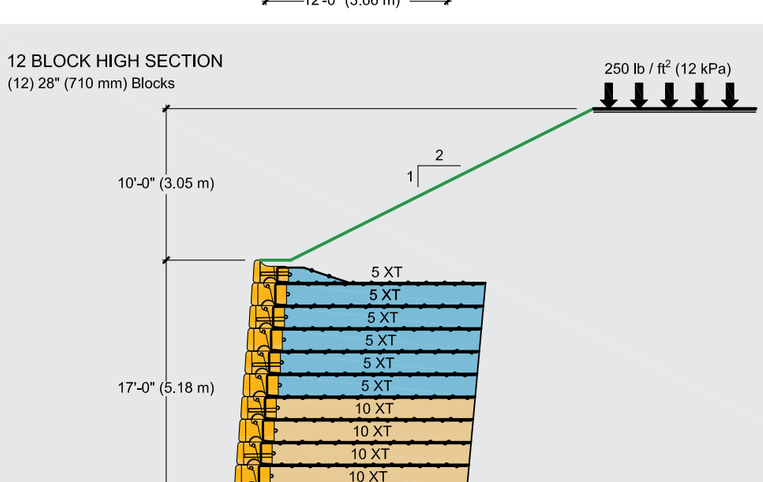
11 BLOCK HIGH SECTION
(11) 28" (710 mm) Blocks



ϕ = 34°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.22	± 0.73
8XT	± 0.19	± 0.61

12 BLOCK HIGH SECTION
(12) 28" (710 mm) Blocks



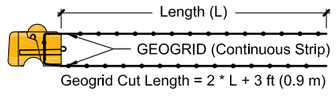
ϕ = 34°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
10XT	± 0.26	± 0.85

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

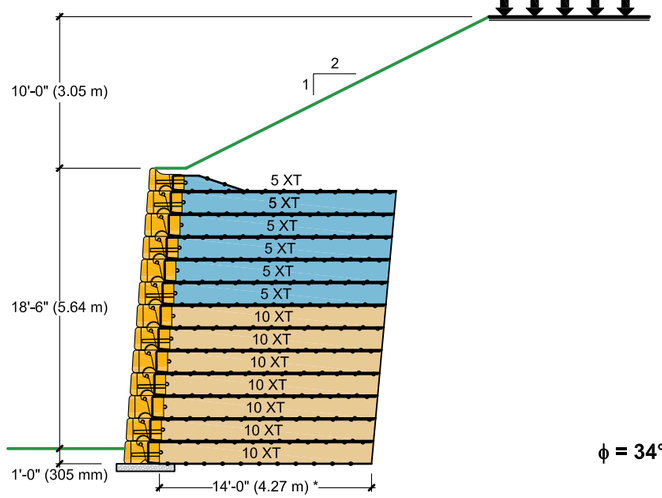
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

13 BLOCK HIGH SECTION
(13) 28" (710 mm) Blocks



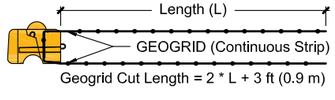
ϕ = 34°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
10XT	± 0.30	± 1.00

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

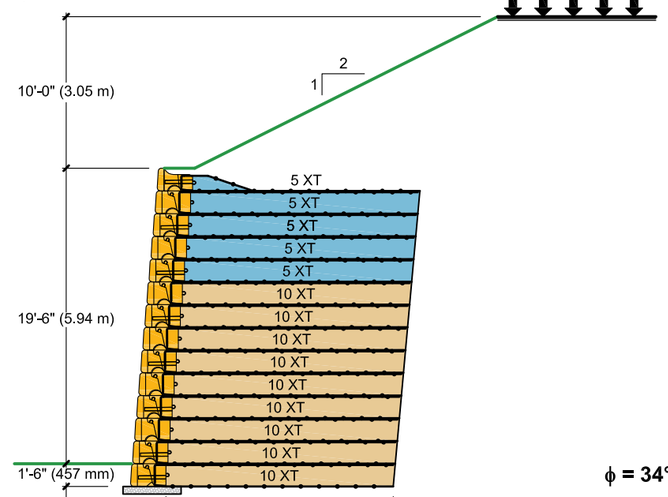
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

14 BLOCK HIGH SECTION
(14) 28" (710 mm) Blocks



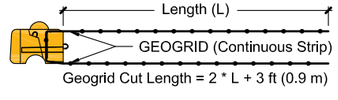
ϕ = 34°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.22	± 0.71
10XT	± 0.39	± 1.28

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

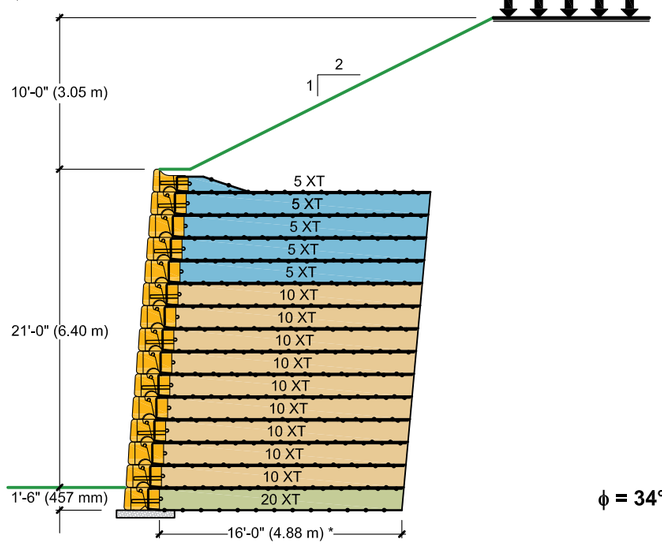
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

15 BLOCK HIGH SECTION
(15) 28" (710 mm) Blocks



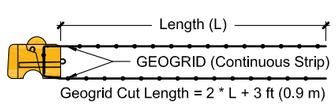
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
10XT	± 0.47	± 1.54
20XT	± 0.05	± 0.17

ϕ = 34°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

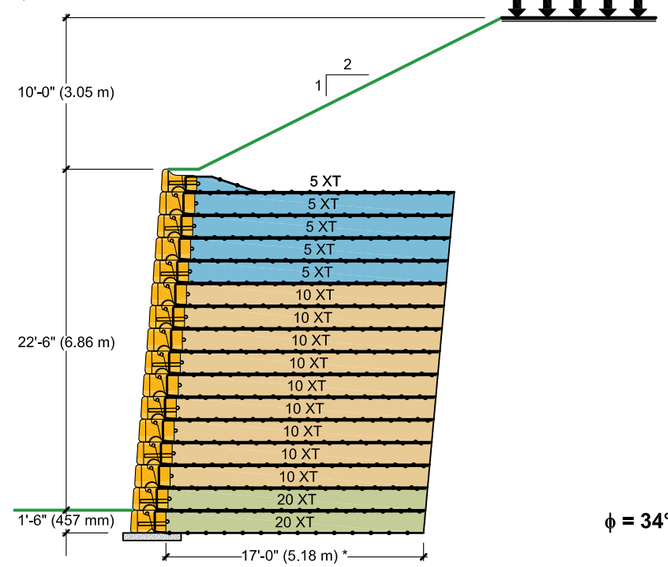
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

16 BLOCK HIGH SECTION
(16) 28" (710 mm) Blocks



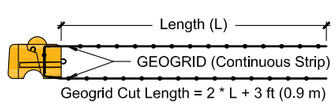
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
10XT	± 0.47	± 1.54
20XT	± 0.10	± 0.34

ϕ = 34°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

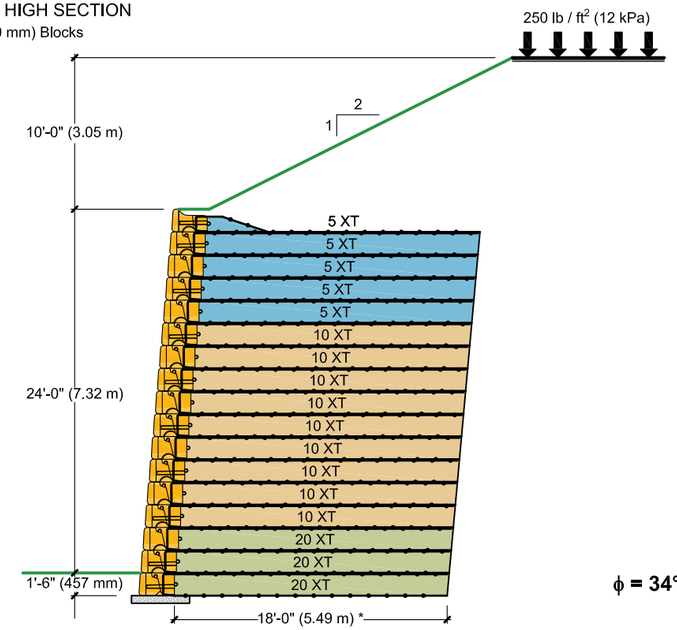
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

17 BLOCK HIGH SECTION
(17) 28" (710 mm) Blocks



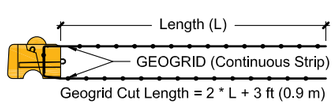
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
10XT	± 0.47	± 1.54
20XT	± 0.16	± 0.51

ϕ = 34°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

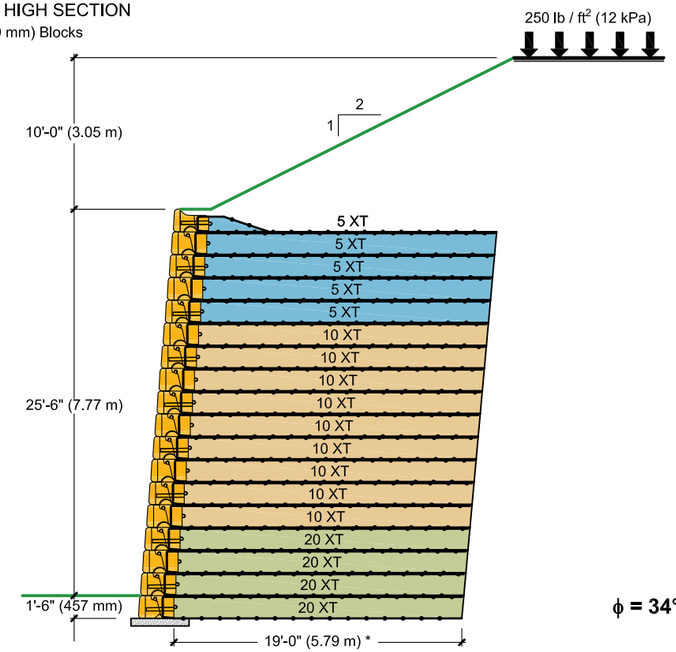
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

18 BLOCK HIGH SECTION
(18) 28" (710 mm) Blocks



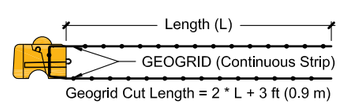
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.33	± 1.07
10XT	± 0.59	± 1.92
20XT	± 0.26	± 0.85

ϕ = 34°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

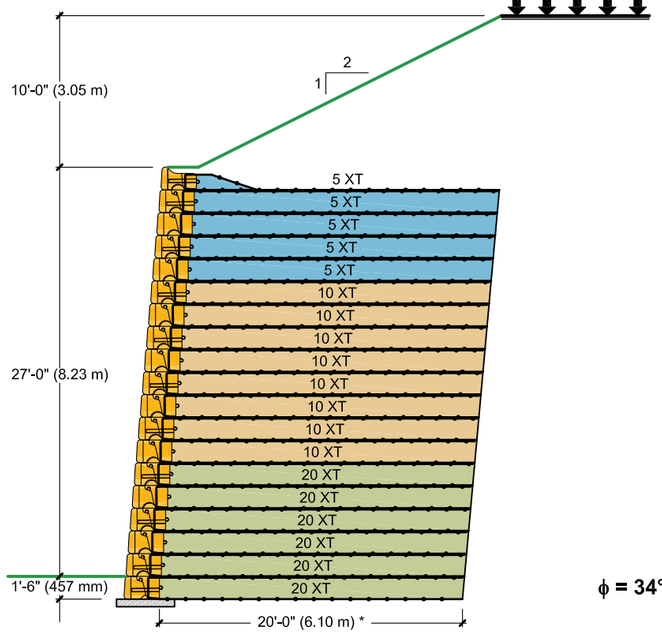
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

19 BLOCK HIGH SECTION
(19) 28" (710 mm) Blocks



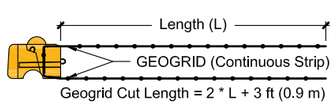
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.33	± 1.07
10XT	± 0.52	± 1.71
20XT	± 0.39	± 1.28

ϕ = 34°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

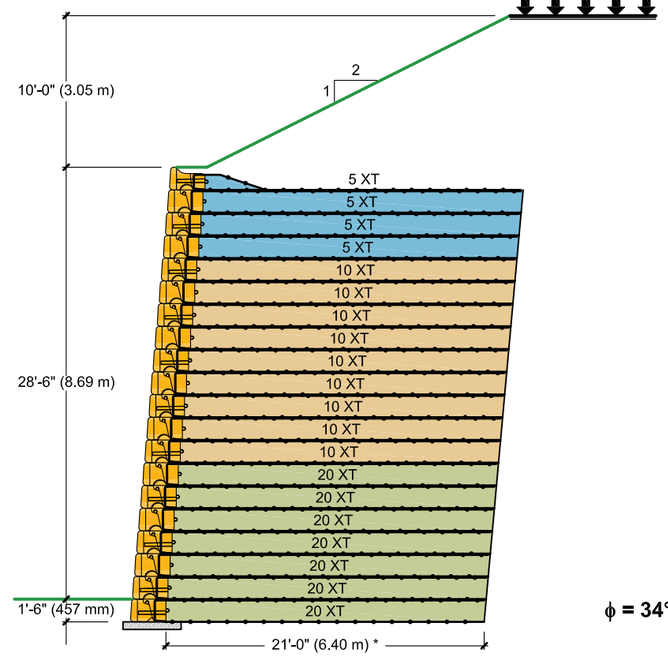
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 34° | DENSE WELL-GRADED SAND or SAND AND GRAVEL

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

20 BLOCK HIGH SECTION **
(20) 28" (710 mm) Blocks



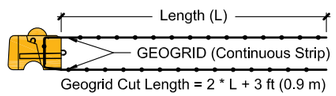
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
10XT	± 0.59	± 1.92
20XT	± 0.46	± 1.49

ϕ = 34°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

**** Not tall enough? You can build significantly taller walls with the Redi-Rock PC System...we just had to stop the preliminary sections somewhere. Talk to your Engineer or give us a call for more info.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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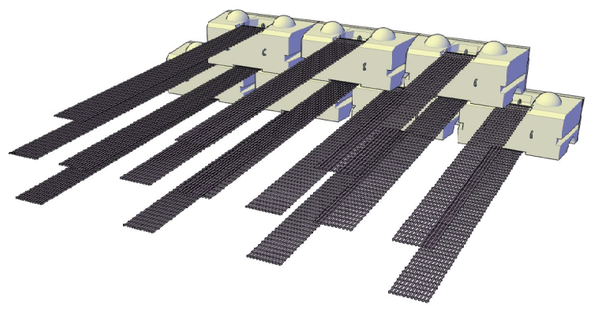
POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

Positive Connection System MSE Walls	SECTION 2 OF 3
Assumed reinforced zone, retained, and foundation soils for this Section	SW, SP, SM
Internal angle of friction	ϕ = 30°
Unit weight	γ = 120 lb / ft^3 (18.8 kN / m^3)
Cohesion	c = 0 lb / ft^2 (0 kPa)



POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

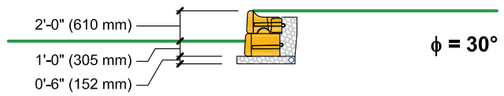
Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

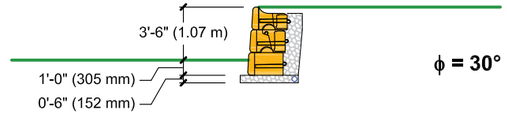
2 BLOCK SECTION
(2) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
No Geogrid Needed		



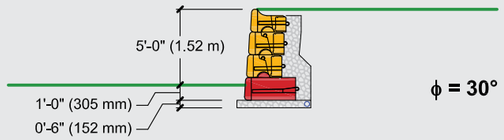
3 BLOCK SECTION
(3) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
No Geogrid Needed		



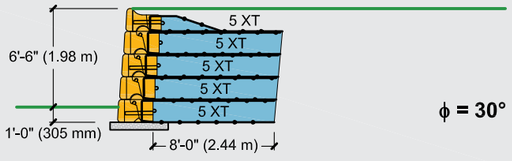
4 BLOCK SECTION
(3) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
No Geogrid Needed		



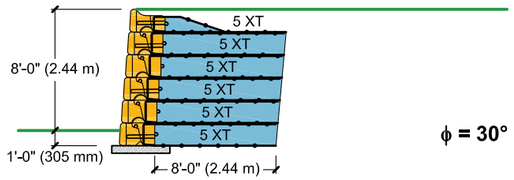
5 BLOCK SECTION
(5) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.13	± 0.43



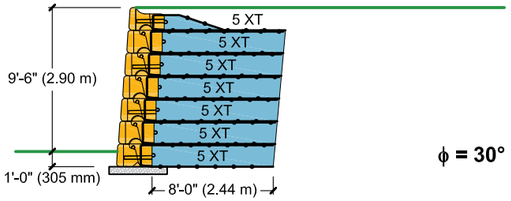
6 BLOCK SECTION
(6) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.16	± 0.51



7 BLOCK SECTION
(7) 28" (710 mm) Blocks

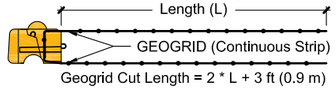
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.18	± 0.60



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

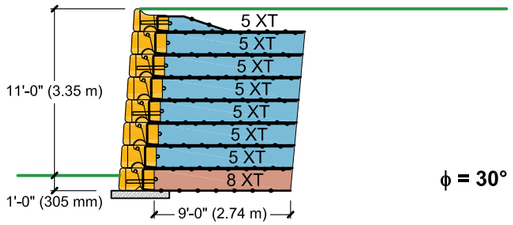
Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

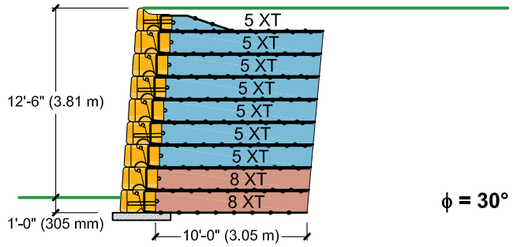
8 BLOCK SECTION
(8) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.20	± 0.66
8XT	± 0.03	± 0.09



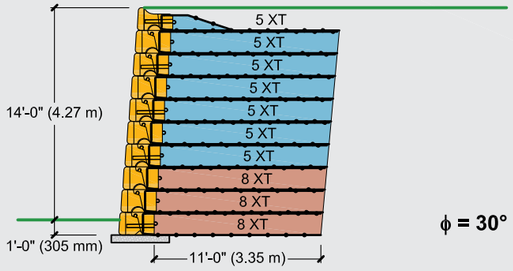
9 BLOCK SECTION
(9) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.23	± 0.75
8XT	± 0.07	± 0.21



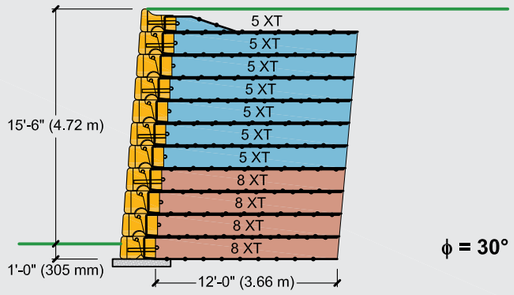
10 BLOCK SECTION
(10) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.23	± 0.75
8XT	± 0.10	± 0.32



11 BLOCK SECTION
(11) 28" (710 mm) Blocks

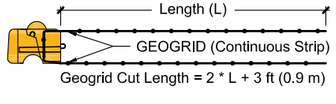
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
8XT	± 0.15	± 0.49



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

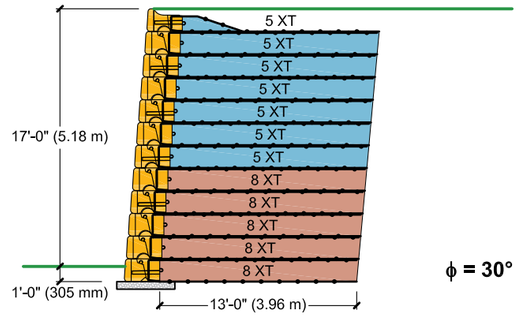
Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

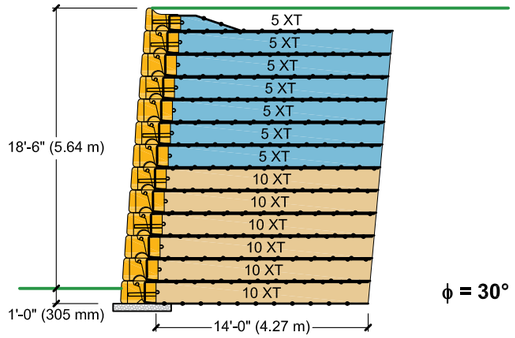
12 BLOCK SECTION
(12) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.30	± 1.00
8XT	± 0.22	± 0.71



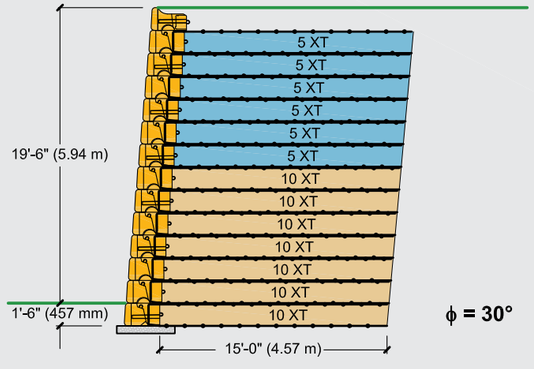
13 BLOCK SECTION
(13) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.30	± 1.00
10XT	± 0.26	± 0.85



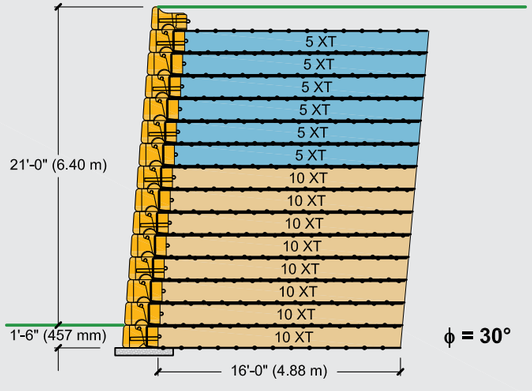
14 BLOCK SECTION
(14) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
10XT	± 0.30	± 1.00



15 BLOCK SECTION
(15) 28" (710 mm) Blocks

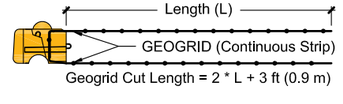
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.31	± 1.02
10XT	± 0.42	± 1.37



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

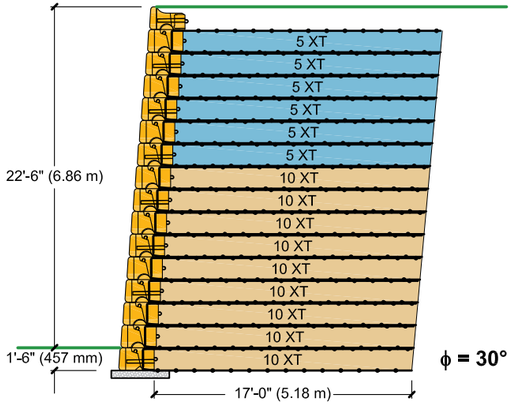
Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

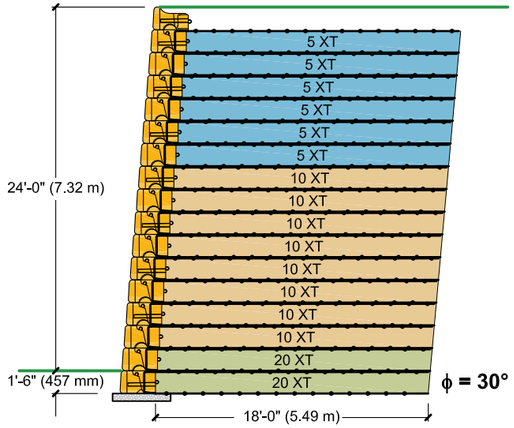
16 BLOCK SECTION
(16) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.31	± 1.02
10XT	± 0.47	± 1.54



17 BLOCK SECTION
(17) 28" (710 mm) Blocks

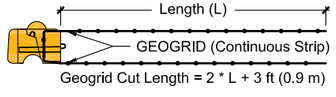
Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.31	± 1.02
10XT	± 0.42	± 1.37
20XT	± 0.10	± 0.34



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

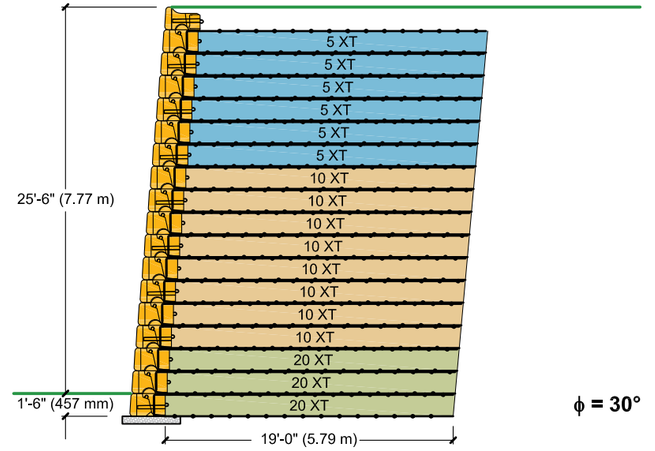
Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

18 BLOCK SECTION
(18) 28" (710 mm) Blocks

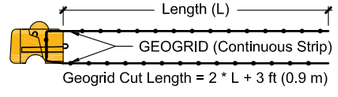
Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.39	± 1.28
10XT	± 0.52	± 1.71
20XT	± 0.20	± 0.64



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

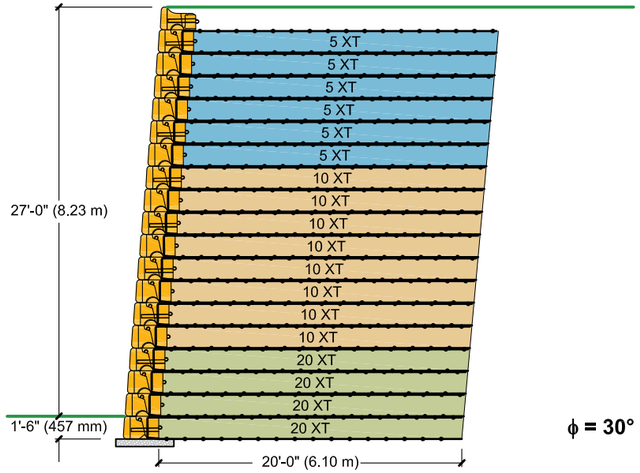
Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

19 BLOCK SECTION
(19) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.39	± 1.28
10XT	± 0.52	± 1.71
20XT	± 0.26	± 0.85

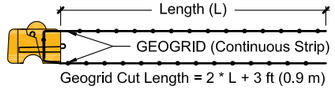


ϕ = 30°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

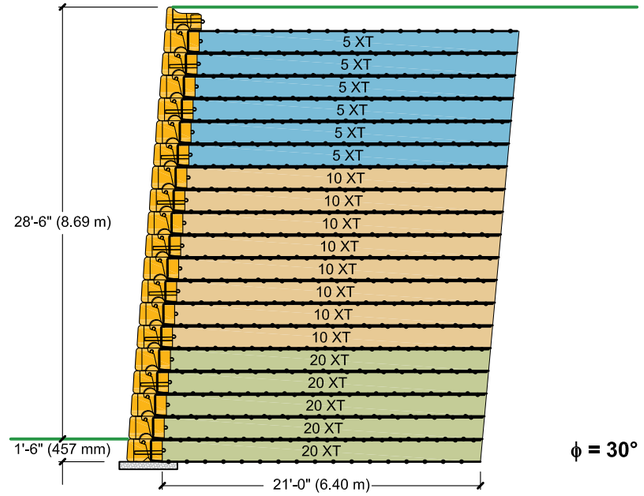
Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

20 BLOCK SECTION *
(20) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.39	± 1.28
10XT	± 0.52	± 1.71
20XT	± 0.33	± 1.07

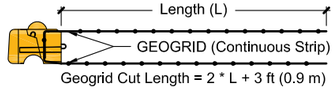


ϕ = 30°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Not tall enough? You can build significantly taller walls with the Redi-Rock PC System...we just had to stop the preliminary sections somewhere. Talk to your Engineer or give us a call for more info.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

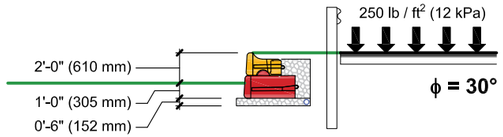
ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

2 BLOCK SECTION

(1) 28" (710 mm) Block
(1) 41" (1030 mm) Block

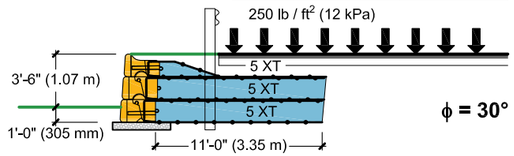
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
No Geogrid Needed		



3 BLOCK SECTION

(3) 28" (710 mm) Blocks

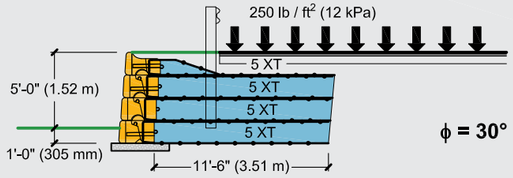
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.10	± 0.32



4 BLOCK SECTION

(4) 28" (710 mm) Blocks

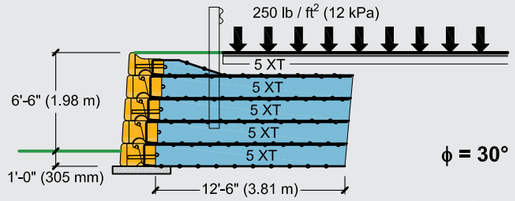
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.15	± 0.49



5 BLOCK SECTION

(5) 28" (710 mm) Blocks

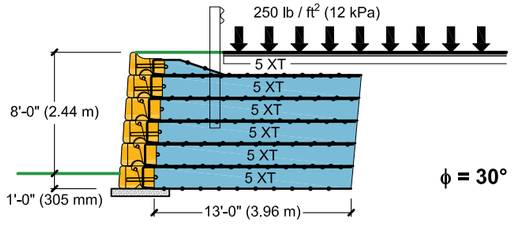
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.19	± 0.61



6 BLOCK SECTION

(6) 28" (710 mm) Blocks

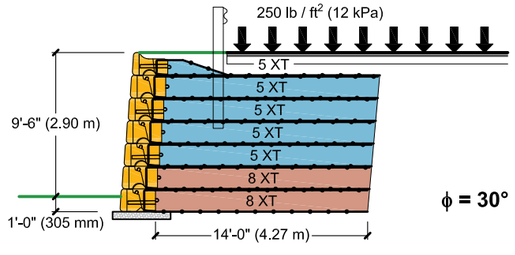
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85



7 BLOCK SECTION

(7) 28" (710 mm) Blocks

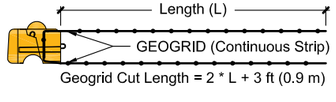
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.22	± 0.71
8XT	± 0.09	± 0.28



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

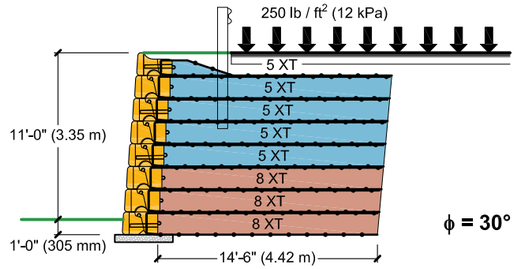
ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

8 BLOCK SECTION

(8) 28" (710 mm) Blocks

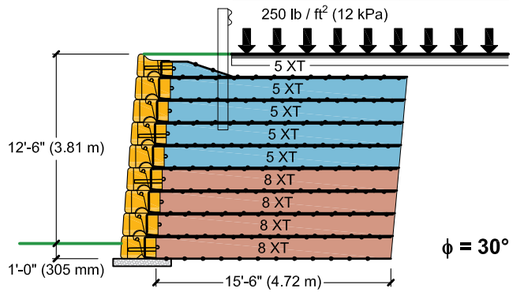
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.22	± 0.71
8XT	± 0.13	± 0.43



9 BLOCK SECTION

(9) 28" (710 mm) Blocks

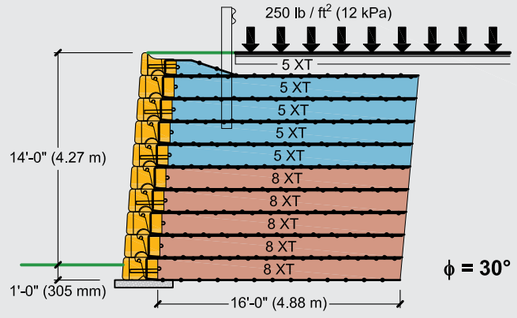
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
8XT	± 0.21	± 0.68



10 BLOCK SECTION

(10) 28" (710 mm) Blocks

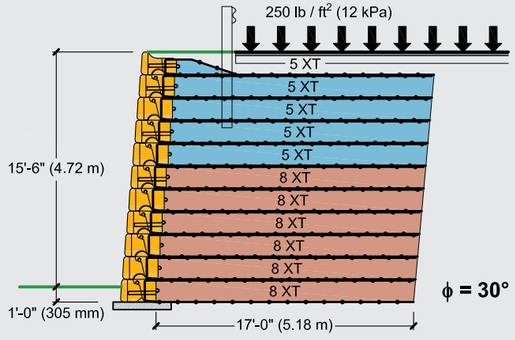
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
8XT	± 0.26	± 0.85



11 BLOCK SECTION

(11) 28" (710 mm) Blocks

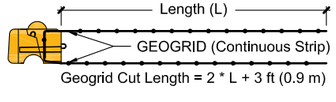
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
8XT	± 0.31	± 1.02



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

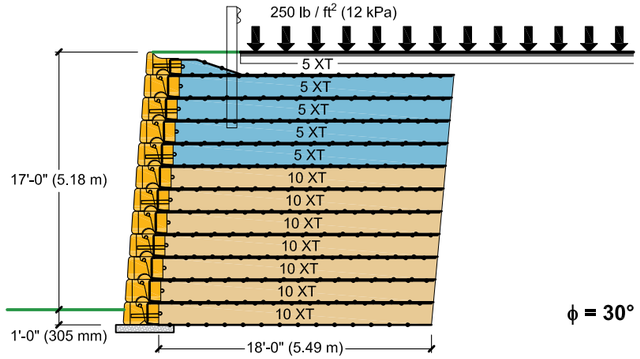
Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

12 BLOCK SECTION
(12) 28" (710 mm) Blocks

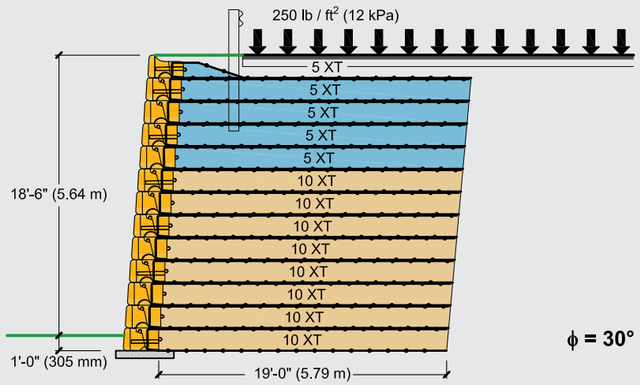
Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.26	± 0.85
10XT	± 0.36	± 1.19



ϕ = 30°

13 BLOCK SECTION
(13) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.33	± 1.07
10XT	± 0.52	± 1.71

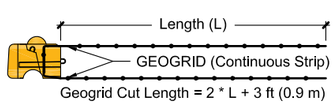


ϕ = 30°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

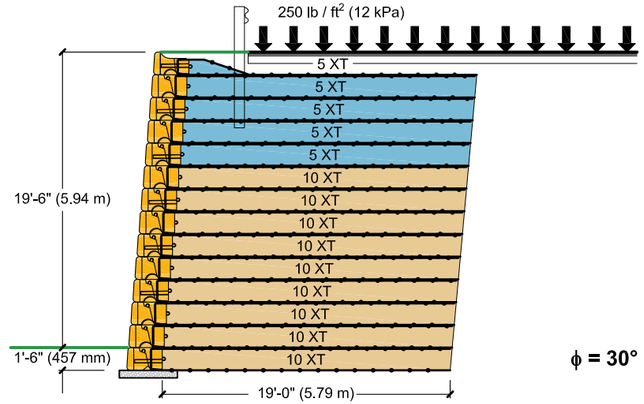
Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

14 BLOCK SECTION
(14) 28" (710 mm) Blocks

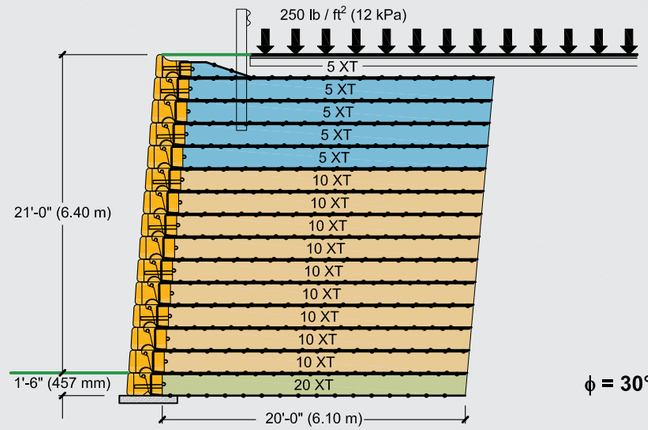
Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.33	± 1.07
10XT	± 0.59	± 1.92



ϕ = 30°

15 BLOCK SECTION
(15) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.33	± 1.07
10XT	± 0.59	± 1.92
20XT	± 0.07	± 0.21

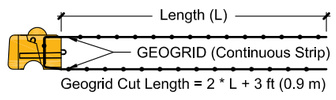


ϕ = 30°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

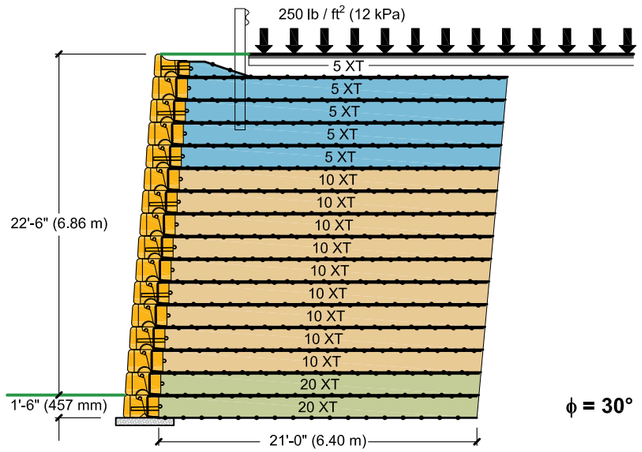
Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

16 BLOCK SECTION
(16) 28" (710 mm) Blocks

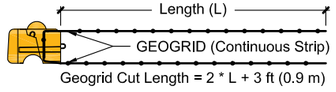
Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.33	± 1.07
10XT	± 0.59	± 1.92
20XT	± 0.13	± 0.43



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

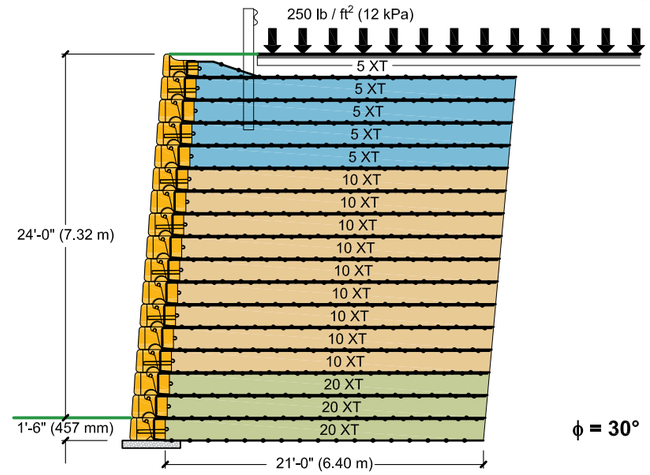
Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

17 BLOCK SECTION
(17) 28" (710 mm) Blocks

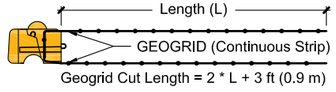
Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.33	± 1.07
10XT	± 0.59	± 1.92
20XT	± 0.20	± 0.64



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

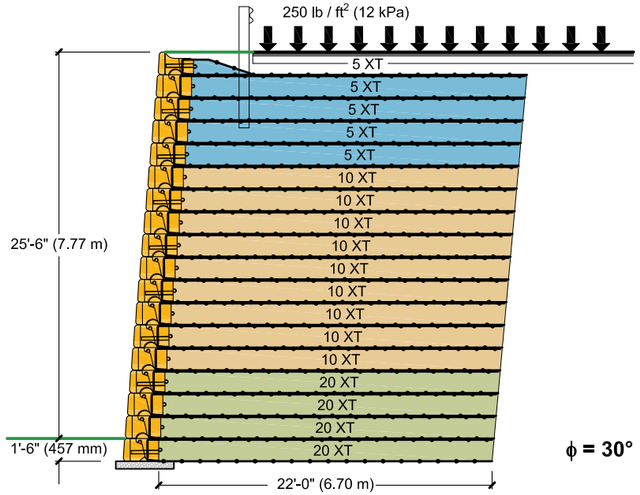
Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

18 BLOCK SECTION
(18) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.33	± 1.07
10XT	± 0.59	± 1.92
20XT	± 0.26	± 0.85

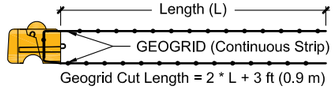


ϕ = 30°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

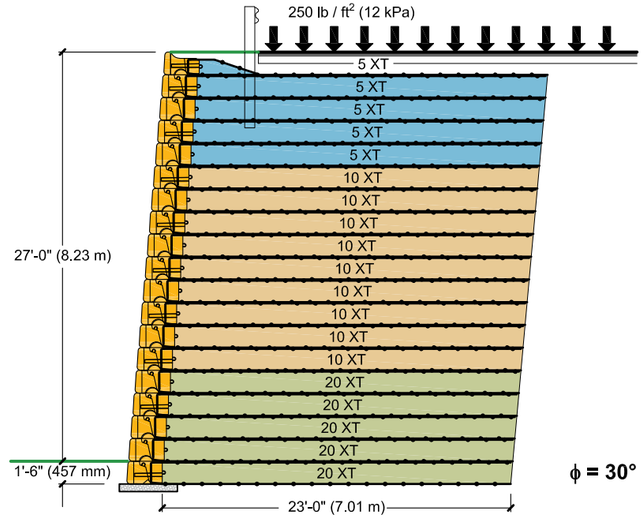
Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

19 BLOCK SECTION
(19) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.33	± 1.07
10XT	± 0.59	± 1.92
20XT	± 0.33	± 1.07

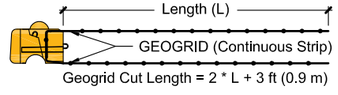


ϕ = 30°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

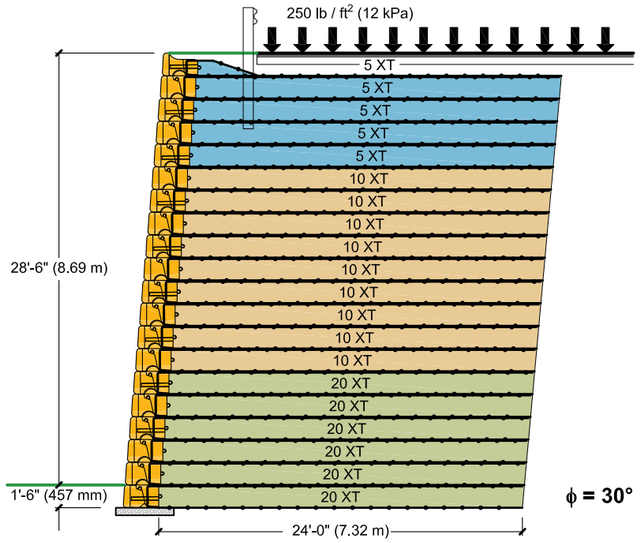
Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

20 BLOCK SECTION *
(20) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.43	± 1.42
10XT	± 0.78	± 2.56
20XT	± 0.52	± 1.71

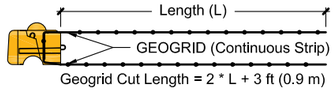


ϕ = 30°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Not tall enough? You can build significantly taller walls with the Redi-Rock PC System...we just had to stop the preliminary sections somewhere. Talk to your Engineer or give us a call for more info.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

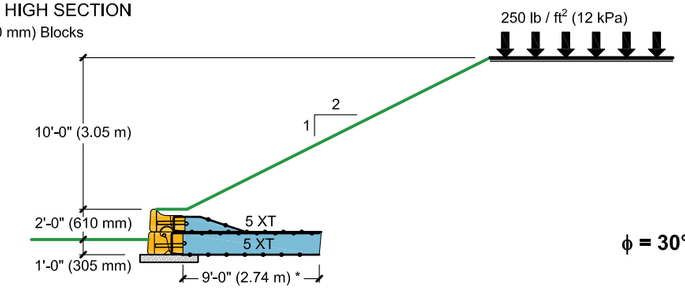
Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

2 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks

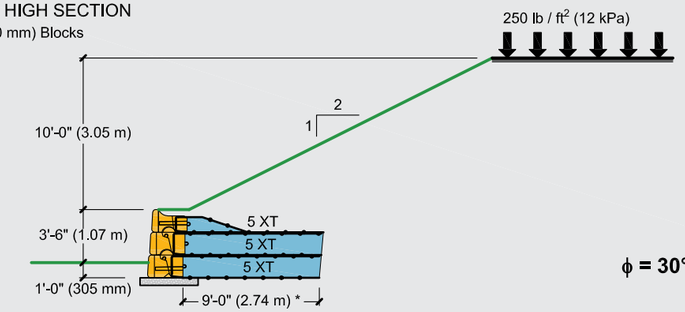
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.06	± 0.19



ϕ = 30°

3 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks

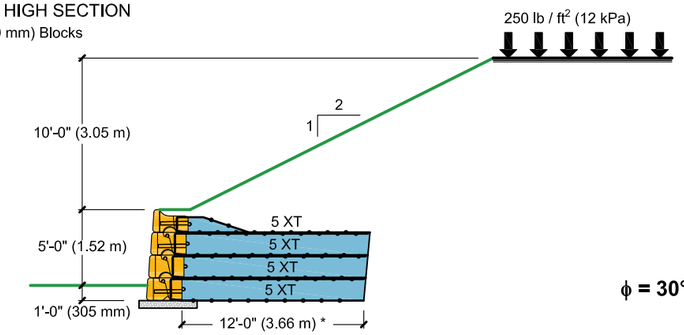
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.09	± 0.28



ϕ = 30°

4 BLOCK HIGH SECTION
(4) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.15	± 0.49

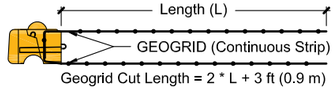


ϕ = 30°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

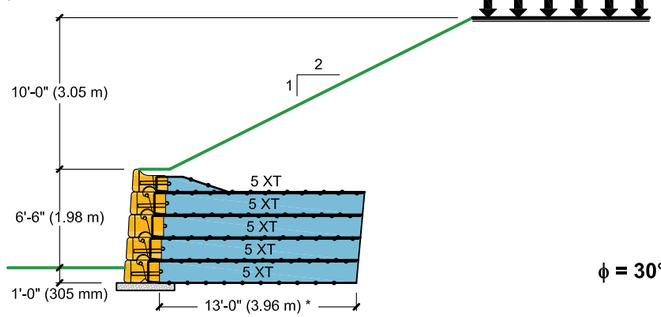
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

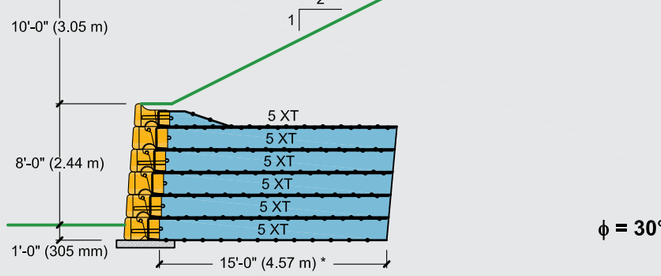
5 BLOCK HIGH SECTION
(5) 28" (710 mm) Blocks



Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.22	± 0.71

ϕ = 30°

6 BLOCK HIGH SECTION
(6) 28" (710 mm) Blocks



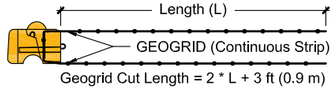
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85

ϕ = 30°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

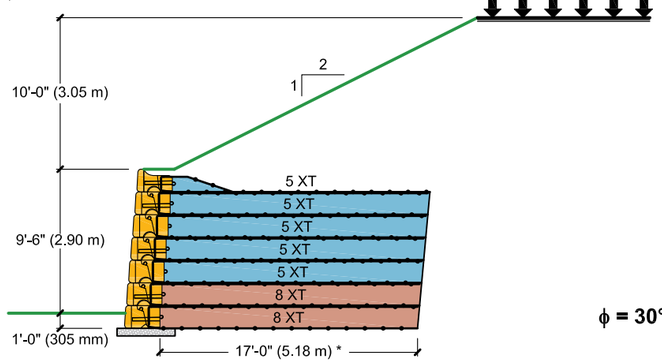
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

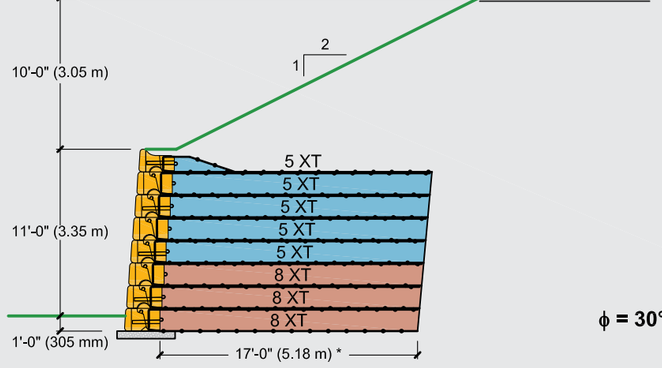
7 BLOCK HIGH SECTION
(7) 28" (710 mm) Blocks



Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
8XT	± 0.10	± 0.34

ϕ = 30°

8 BLOCK HIGH SECTION
(8) 28" (710 mm) Blocks



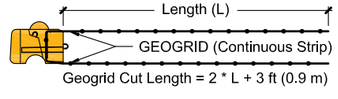
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
8XT	± 0.16	± 0.51

ϕ = 30°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

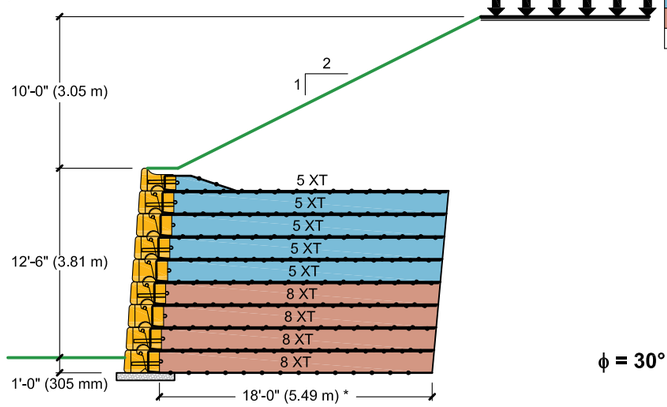
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

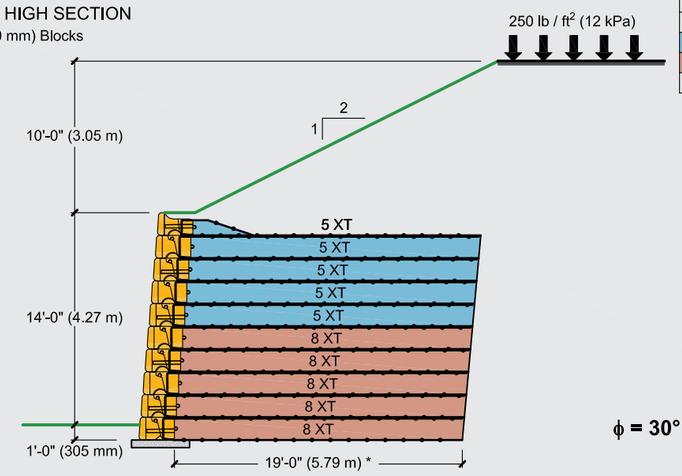
9 BLOCK HIGH SECTION
(9) 28" (710 mm) Blocks



ϕ = 30°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
8XT	± 0.21	± 0.68

10 BLOCK HIGH SECTION
(10) 28" (710 mm) Blocks



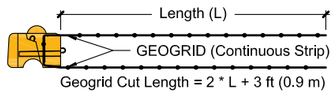
ϕ = 30°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.33	± 1.07
8XT	± 0.33	± 1.07

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

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POSITIVE CONNECTION SYSTEM WALLS

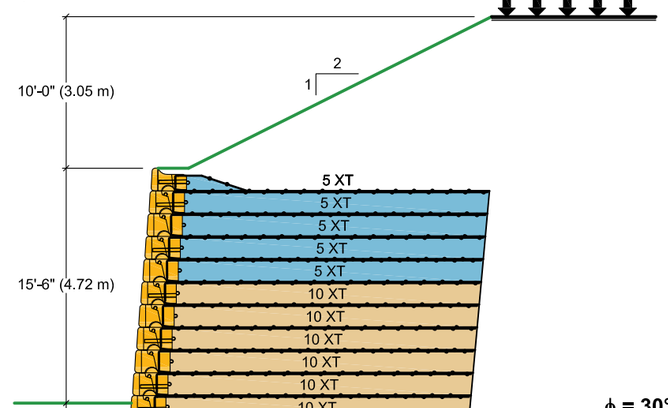
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

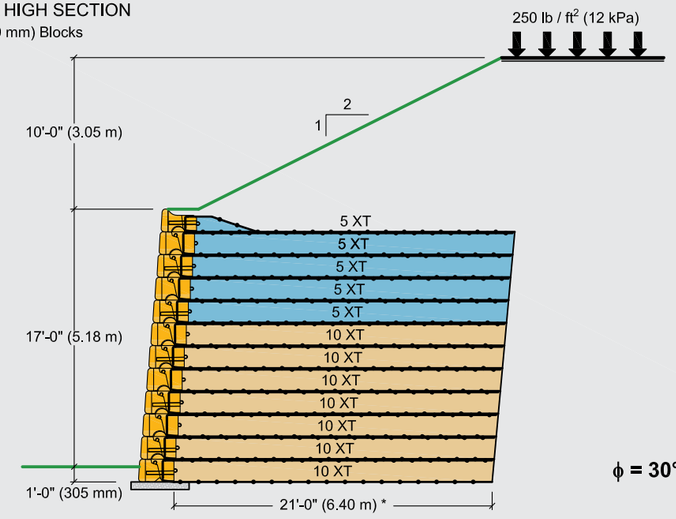
11 BLOCK HIGH SECTION
(11) 28" (710 mm) Blocks



ϕ = 30°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.33	± 1.07
10XT	± 0.39	± 1.28

12 BLOCK HIGH SECTION
(12) 28" (710 mm) Blocks



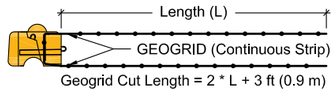
ϕ = 30°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.33	± 1.07
10XT	± 0.46	± 1.49

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

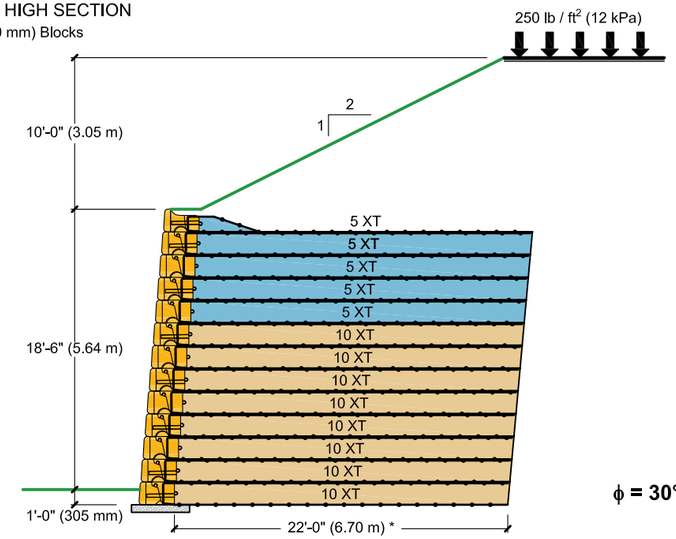
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

13 BLOCK HIGH SECTION
(13) 28" (710 mm) Blocks

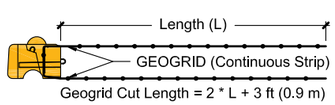


Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.33	± 1.07
10XT	± 0.52	± 1.71

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

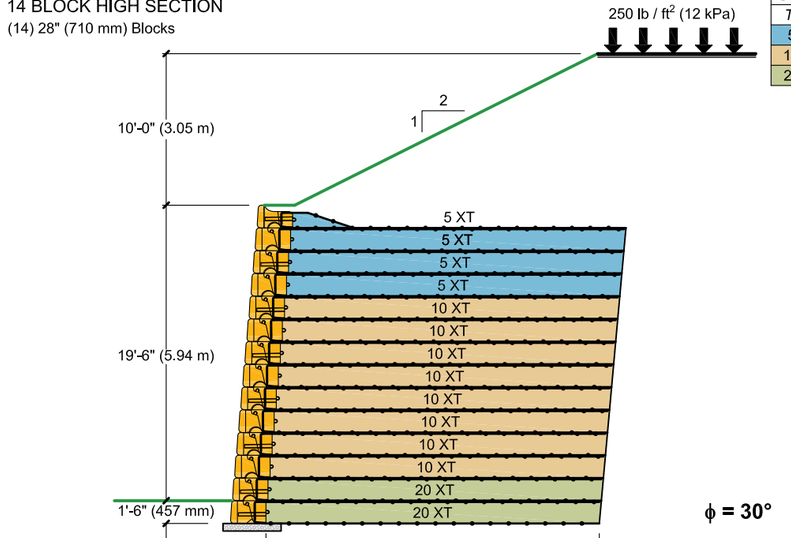
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

14 BLOCK HIGH SECTION
(14) 28" (710 mm) Blocks

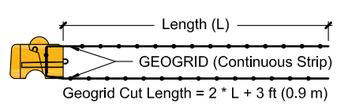


Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
10XT	± 0.52	± 1.71
20XT	± 0.13	± 0.43

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

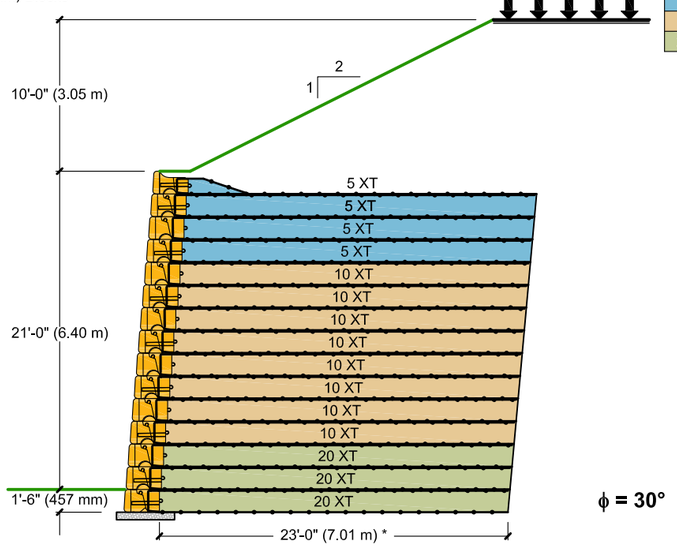
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

15 BLOCK HIGH SECTION
(15) 28" (710 mm) Blocks



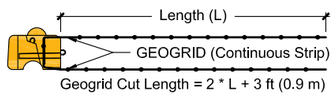
ϕ = 30°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
10XT	± 0.52	± 1.71
20XT	± 0.20	± 0.64

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

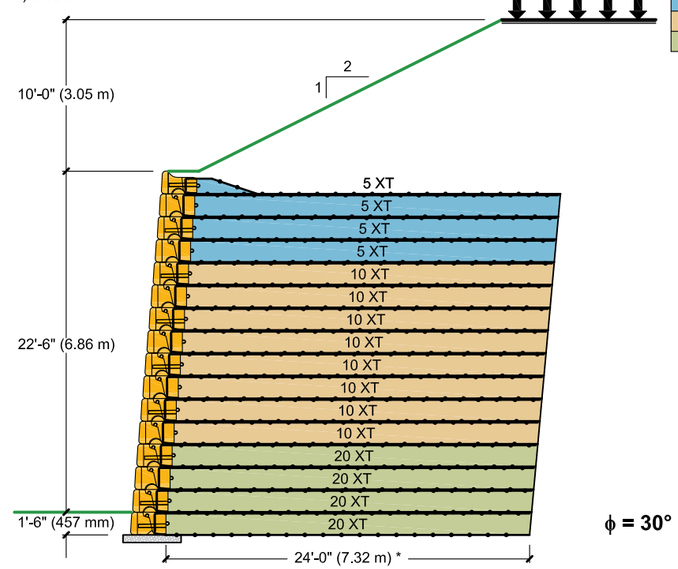
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

16 BLOCK HIGH SECTION
(16) 28" (710 mm) Blocks



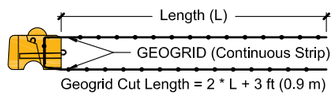
ϕ = 30°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.35	± 1.14
10XT	± 0.69	± 2.28
20XT	± 0.35	± 1.14

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

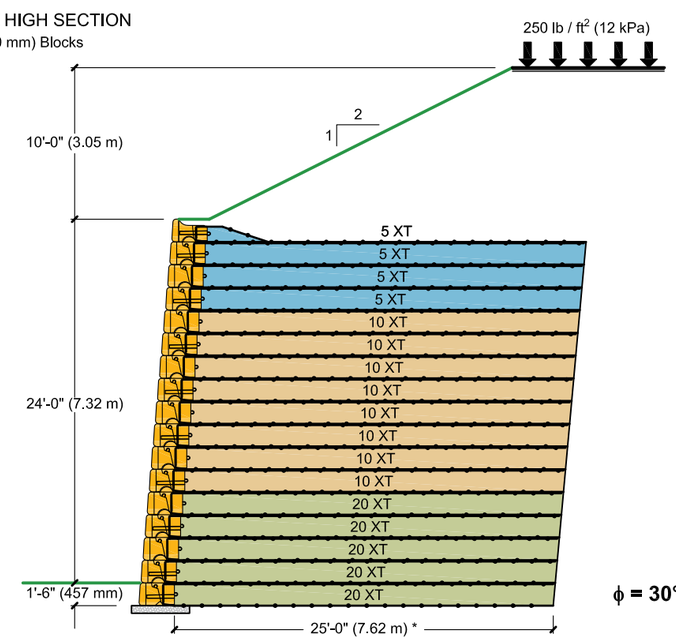
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

17 BLOCK HIGH SECTION
(17) 28" (710 mm) Blocks



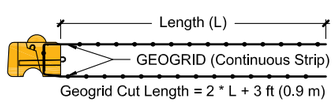
ϕ = 30°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.35	± 1.14
10XT	± 0.69	± 2.28
20XT	± 0.43	± 1.42

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

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POSITIVE CONNECTION SYSTEM WALLS

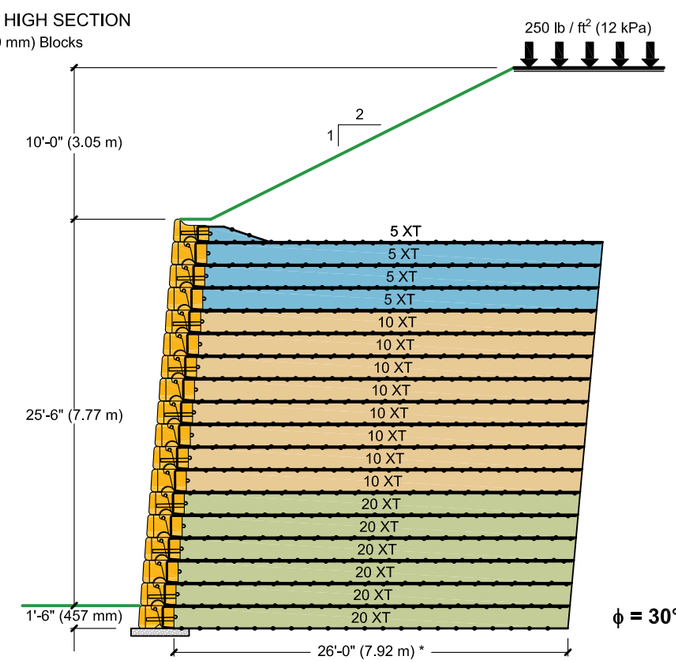
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

18 BLOCK HIGH SECTION
(18) 28" (710 mm) Blocks



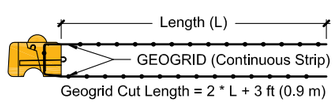
ϕ = 30°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.35	± 1.14
10XT	± 0.69	± 2.28
20XT	± 0.52	± 1.71

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

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SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

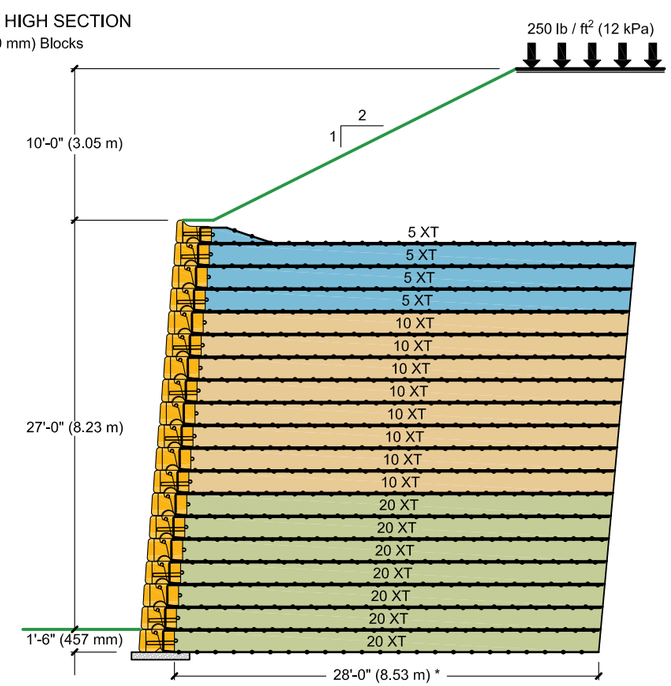
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

19 BLOCK HIGH SECTION
(19) 28" (710 mm) Blocks



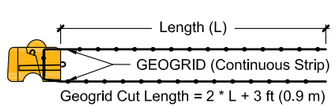
ϕ = 30°

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.35	± 1.14
10XT	± 0.69	± 2.28
20XT	± 0.61	± 1.99

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

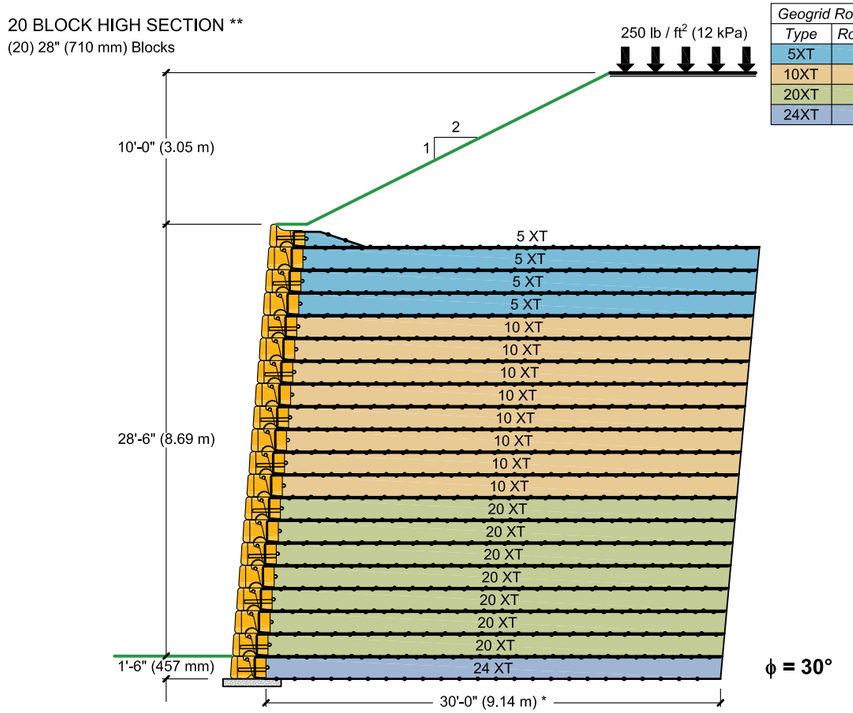
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 30° | FINE TO MEDIUM SAND or SILTY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

20 BLOCK HIGH SECTION **
(20) 28" (710 mm) Blocks



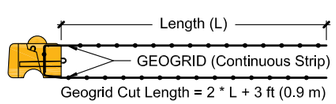
ϕ = 30°

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.35	± 1.14
10XT	± 0.69	± 2.28
20XT	± 0.61	± 1.99
24XT	± 0.09	± 0.28

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

**** Not tall enough? You can build significantly taller walls with the Redi-Rock PC System...we just had to stop the preliminary sections somewhere. Talk to your Engineer or give us a call for more info.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

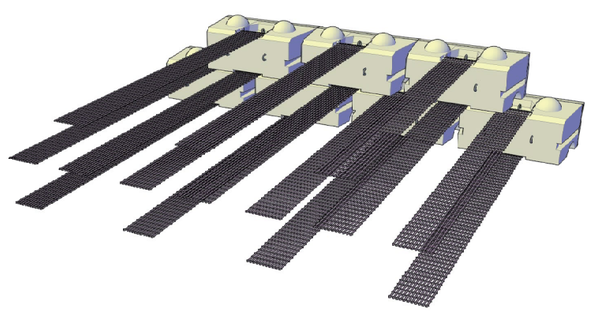
ϕ = 28° | SILTY SAND or CLAYEY SAND

Positive Connection System MSE Walls	SECTION 3 OF 3
Assumed reinforced zone, retained, and foundation soils for this Section [1]	SM, SC
Internal angle of friction	ϕ = 28°
Unit weight	γ = 120 lb / ft^3 (18.8 kN / m^3)
Cohesion	c = 0 lb / ft^2 (0 kPa)
AASHTO requirements for reinforced zone material [2]	
Particles passing 4" (100 mm)	100%
Particles passing the No. 40 (425 μm) Sieve	0% - 60%
Particles passing the No. 200 (75 μm) Sieve [3]	0% - 15%
Plasticity index of material passing the No. 40 (425 μm) Sieve	≤ 6

[1] Assumed material in this section will not typically meet AASHTO requirements for material used in the reinforced soil zone and would need to be replaced with select fill material. Some projects routinely choose to allow the use of on-site soils in the reinforced soil zone. This section of the preliminary reinforcement schedule demonstrates reinforcement requirements for walls that elect to deviate from AASHTO specifications for material in the reinforced soil zone but otherwise design per AASHTO specifications.

[2] AASHTO LRFD *Bridge Construction Specifications – 3rd Edition* (2010) Section 7.3.6.3 Structure Backfill for MSE Walls

[3] Wall designs electing to deviate from AASHTO specifications and relax this requirement shall not exceed 30% particles passing the No. 200 (75 μm) Sieve.



POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

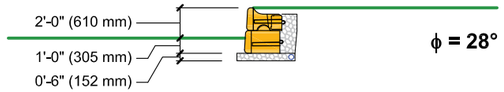
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

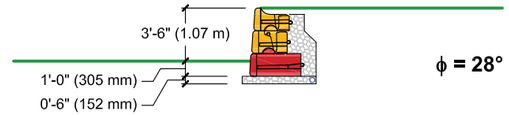
2 BLOCK SECTION
(2) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
No Geogrid Needed		



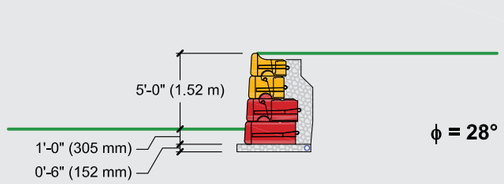
3 BLOCK SECTION
(2) 28" (710 mm) Blocks
(1) 41" (1030 mm) Block

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
No Geogrid Needed		



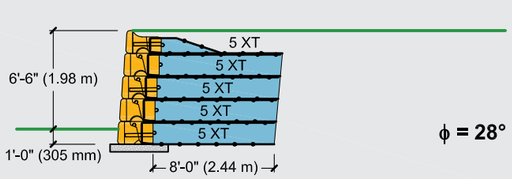
4 BLOCK SECTION
(2) 28" (710 mm) Blocks
(2) 41" (1030 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
No Geogrid Needed		



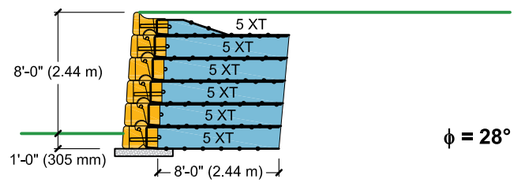
5 BLOCK SECTION
(5) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.13	± 0.43



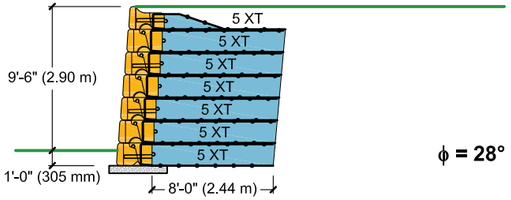
6 BLOCK SECTION
(6) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.16	± 0.51



7 BLOCK SECTION
(7) 28" (710 mm) Blocks

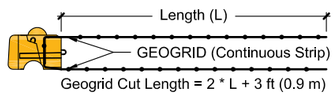
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.18	± 0.60



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

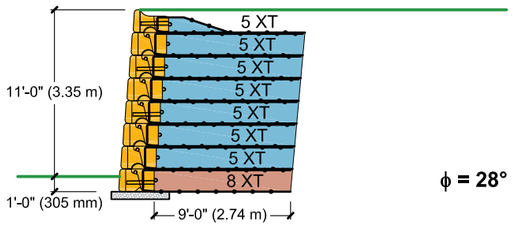
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

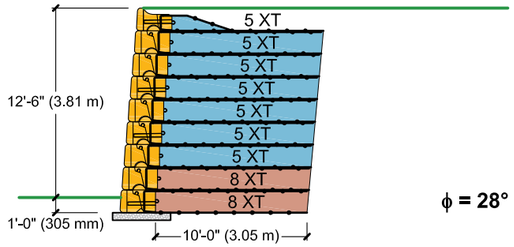
8 BLOCK SECTION
(8) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.20	± 0.66
8XT	± 0.03	± 0.09



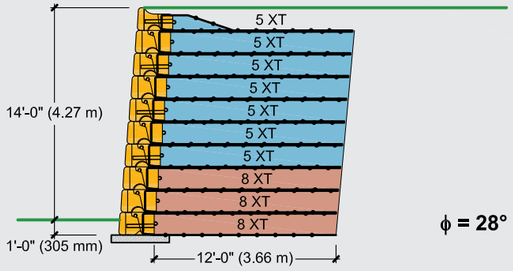
9 BLOCK SECTION
(9) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.23	± 0.75
8XT	± 0.07	± 0.21



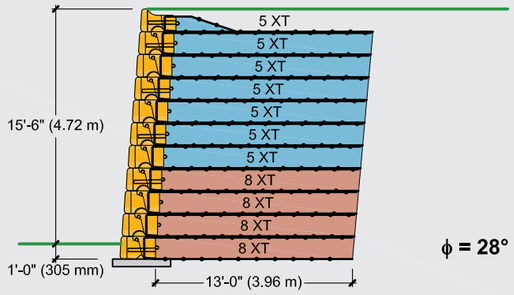
10 BLOCK SECTION
(10) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
8XT	± 0.11	± 0.37



11 BLOCK SECTION
(11) 28" (710 mm) Blocks

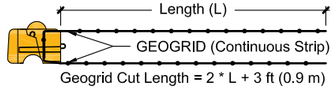
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.30	± 1.00
8XT	± 0.17	± 0.57



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

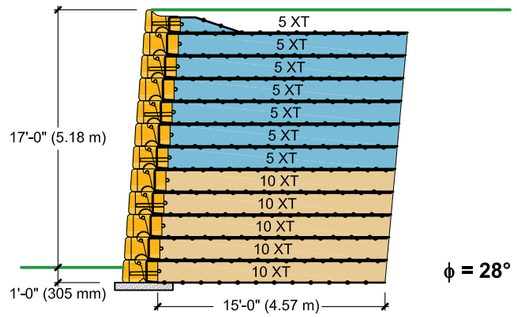
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

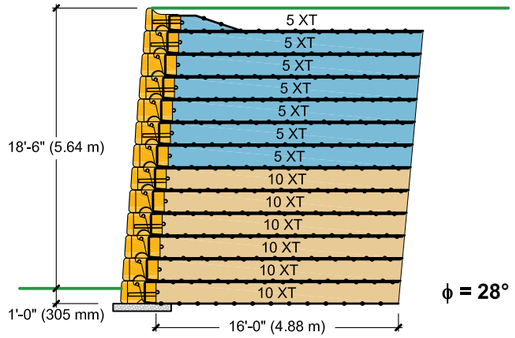
12 BLOCK SECTION
(12) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.30	± 1.00
10XT	± 0.22	± 0.71



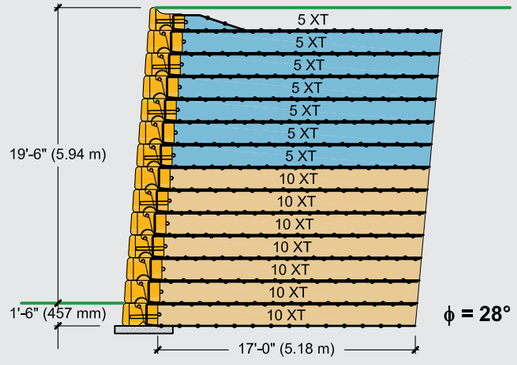
13 BLOCK SECTION
(13) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.36	± 1.19
10XT	± 0.31	± 1.02



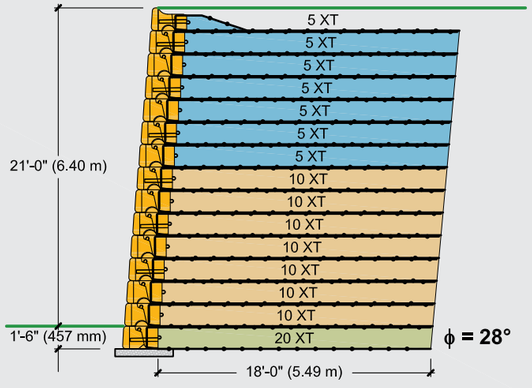
14 BLOCK SECTION
(14) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.36	± 1.19
10XT	± 0.36	± 1.19



15 BLOCK SECTION
(15) 28" (710 mm) Blocks

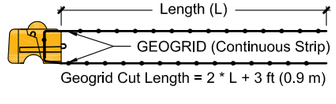
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.36	± 1.19
10XT	± 0.36	± 1.19
20XT	± 0.05	± 0.17



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

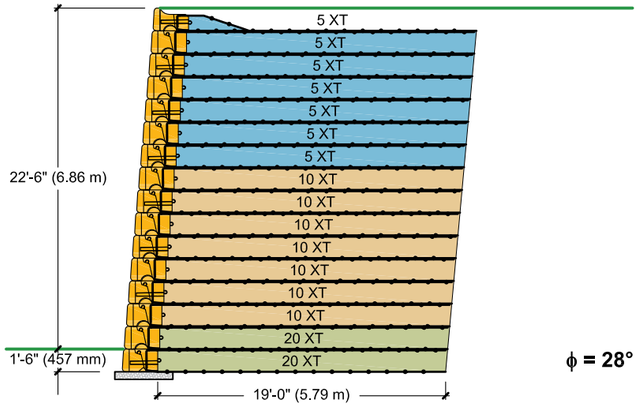
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

16 BLOCK SECTION
(16) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.46	± 1.49
10XT	± 0.46	± 1.49
20XT	± 0.13	± 0.43

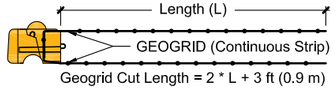


ϕ = 28°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

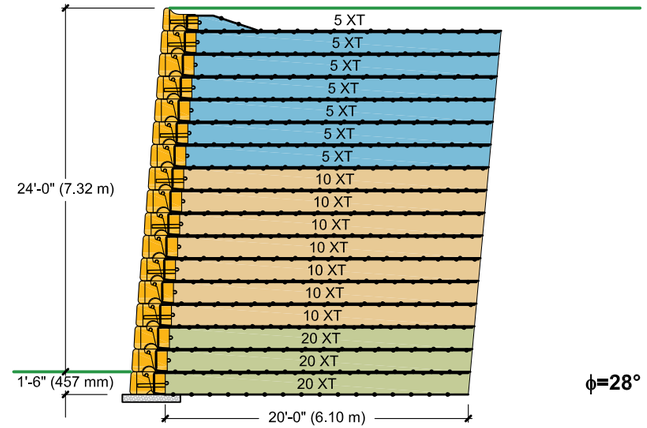
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

17 BLOCK SECTION
(17) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.46	± 1.49
10XT	± 0.46	± 1.49
20XT	± 0.20	± 0.64

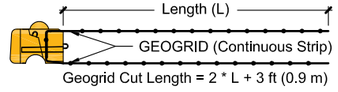


ϕ=28°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

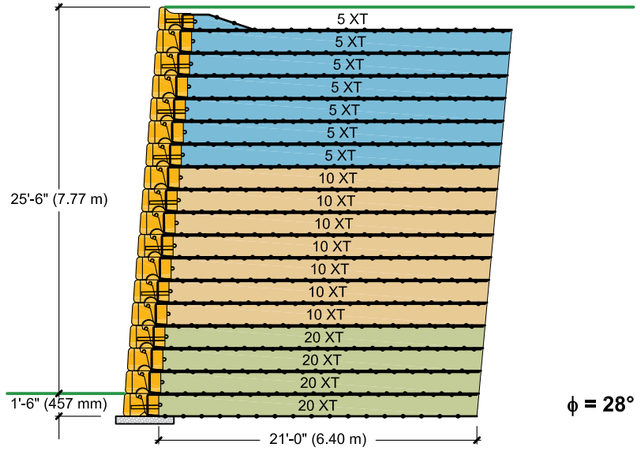
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

18 BLOCK SECTION
(18) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.46	± 1.49
10XT	± 0.46	± 1.49
20XT	± 0.26	± 0.85

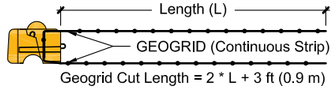


ϕ = 28°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

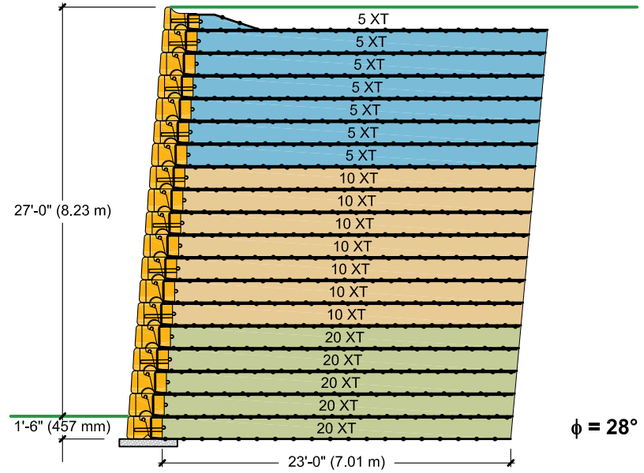
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

19 BLOCK SECTION
(19) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.46	± 1.49
10XT	± 0.46	± 1.49
20XT	± 0.33	± 1.07

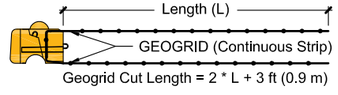


ϕ = 28°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

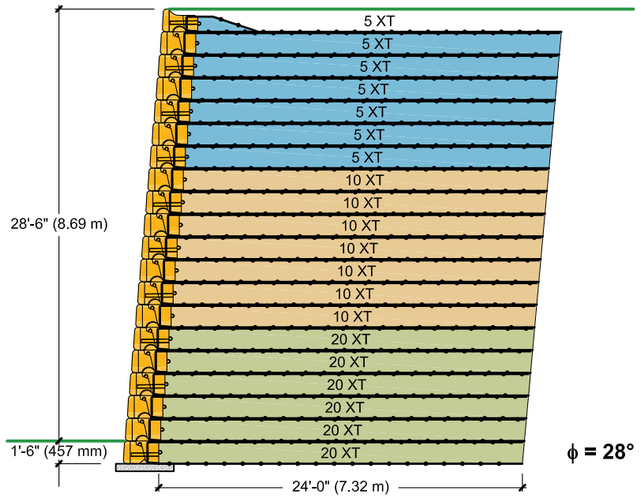
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION A | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

20 BLOCK SECTION *
(20) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.61	± 1.99
10XT	± 0.61	± 1.99
20XT	± 0.52	± 1.71

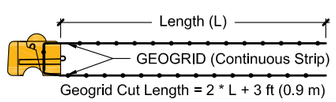


ϕ = 28°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Not tall enough? You can build significantly taller walls with the Redi-Rock PC System...we just had to stop the preliminary sections somewhere. Talk to your Engineer or give us a call for more info.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

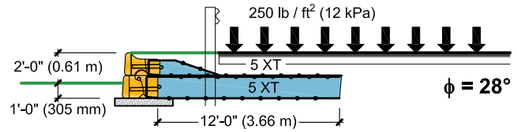
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

2 BLOCK SECTION
(2) 28" (710 mm) Blocks

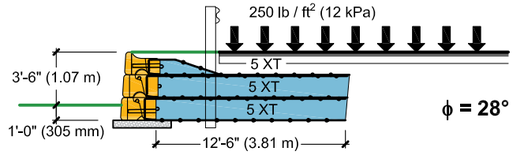
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.07	± 0.24



ϕ = 28°

3 BLOCK SECTION
(3) 28" (710 mm) Blocks

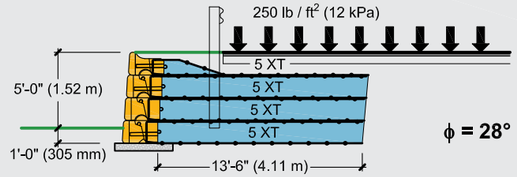
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.11	± 0.37



ϕ = 28°

4 BLOCK SECTION
(4) 28" (710 mm) Blocks

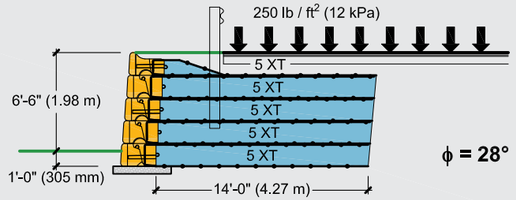
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.17	± 0.57



ϕ = 28°

5 BLOCK SECTION
(5) 28" (710 mm) Blocks

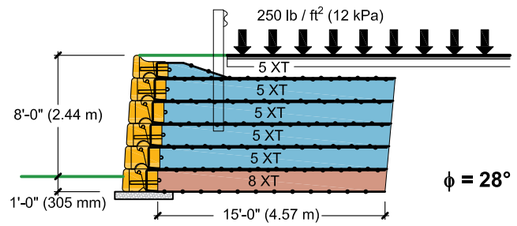
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.22	± 0.71



ϕ = 28°

6 BLOCK SECTION
(6) 28" (710 mm) Blocks

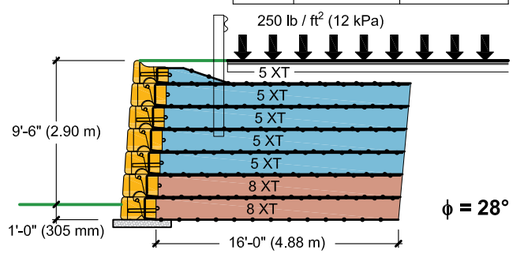
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.22	± 0.71
8XT	± 0.04	± 0.14



ϕ = 28°

7 BLOCK SECTION
(7) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
8XT	± 0.10	± 0.34

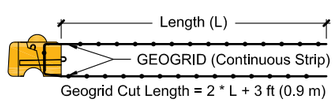


ϕ = 28°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

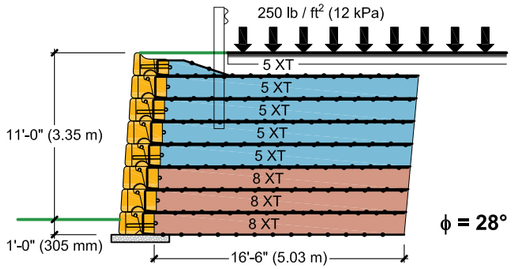
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

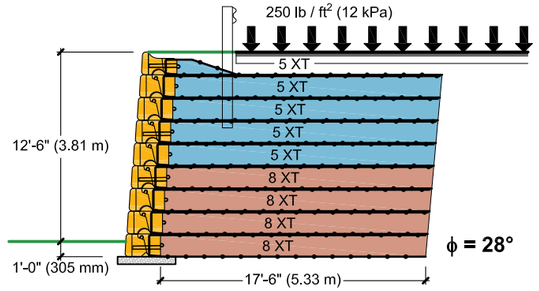
8 BLOCK SECTION
(8) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
8XT	± 0.16	± 0.51



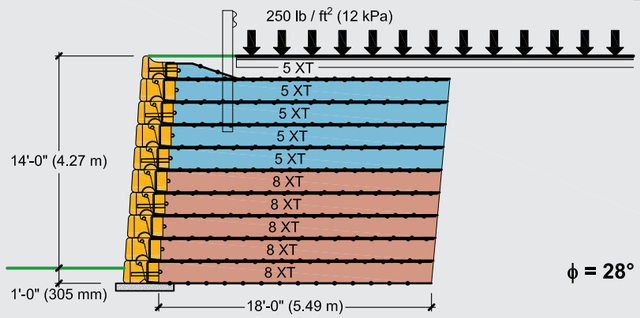
9 BLOCK SECTION
(9) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
8XT	± 0.21	± 0.68



10 BLOCK SECTION
(10) 28" (710 mm) Blocks

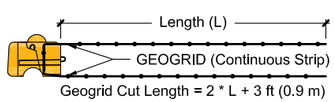
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
8XT	± 0.26	± 0.85



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

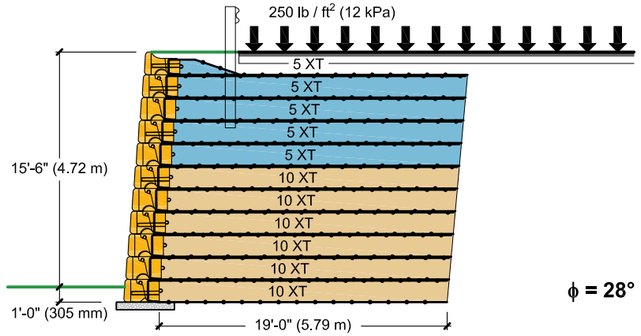
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

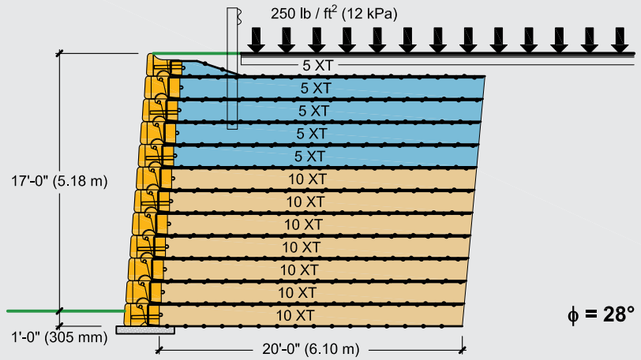
11 BLOCK SECTION
(11) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.33	± 1.07
10XT	± 0.39	± 1.28



12 BLOCK SECTION
(12) 28" (710 mm) Blocks

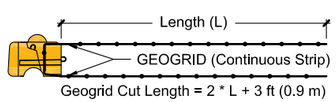
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.33	± 1.07
10XT	± 0.46	± 1.49



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

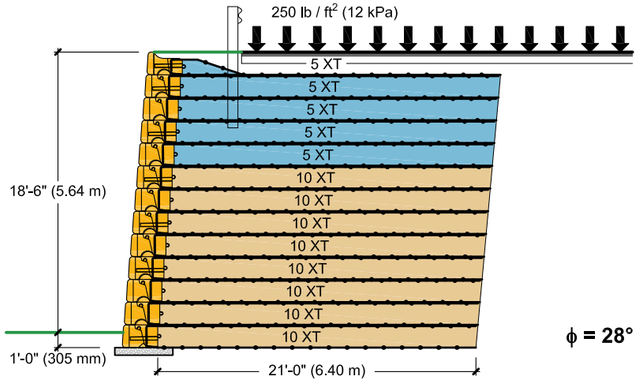
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

13 BLOCK SECTION
(13) 28" (710 mm) Blocks

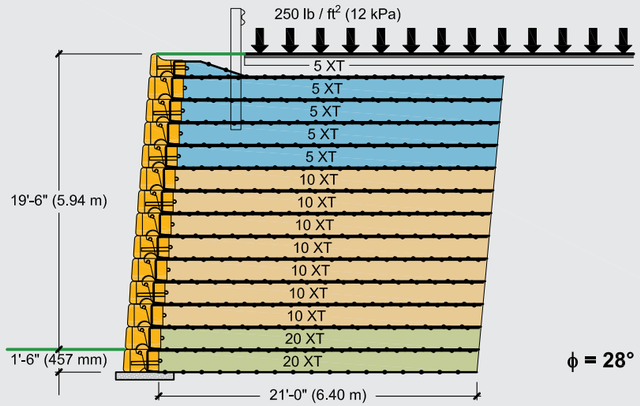
Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.33	± 1.07
10XT	± 0.52	± 1.71



ϕ = 28°

14 BLOCK SECTION
(14) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.33	± 1.07
10XT	± 0.46	± 1.49
20XT	± 0.13	± 0.43

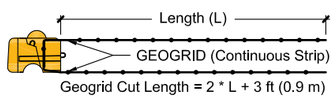


ϕ = 28°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

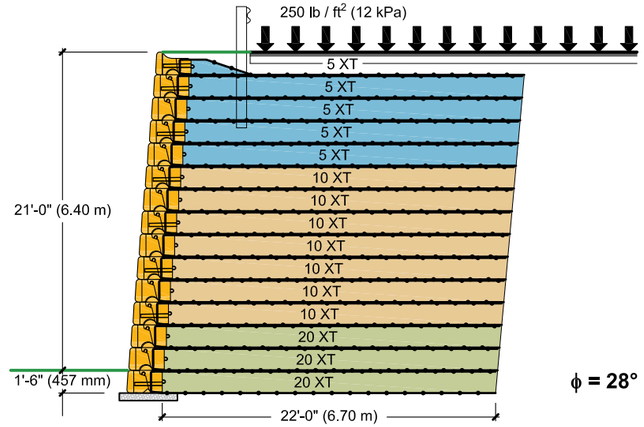
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

15 BLOCK SECTION
(15) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.33	± 1.07
10XT	± 0.46	± 1.49
20XT	± 0.20	± 0.64

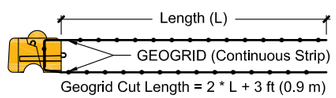


ϕ = 28°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

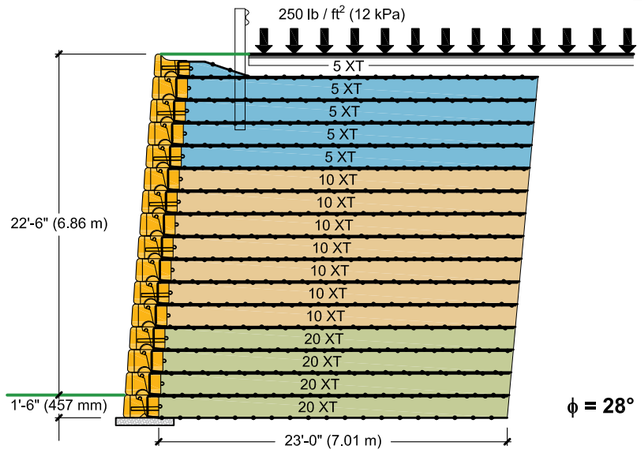
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

16 BLOCK SECTION
(16) 28" (710 mm) Blocks

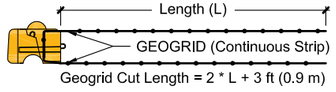
Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.33	± 1.07
10XT	± 0.46	± 1.49
20XT	± 0.26	± 0.85



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

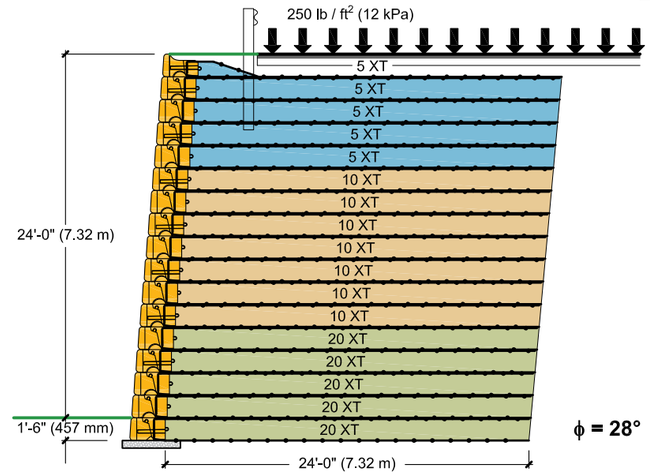
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

17 BLOCK SECTION
(17) 28" (710 mm) Blocks

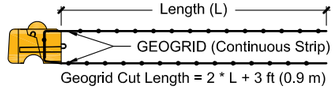
Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.43	± 1.42
10XT	± 0.61	± 1.99
20XT	± 0.43	± 1.42



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

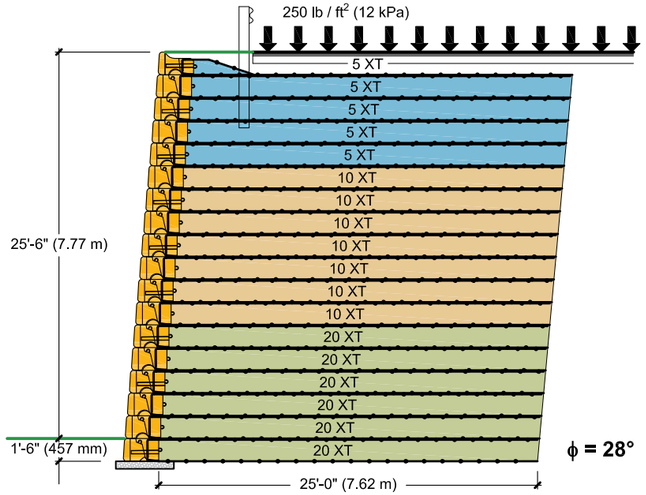
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

18 BLOCK SECTION
(18) 28" (710 mm) Blocks

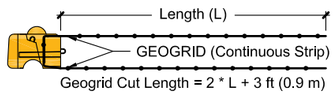
Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.43	± 1.42
10XT	± 0.61	± 1.99
20XT	± 0.52	± 1.71



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

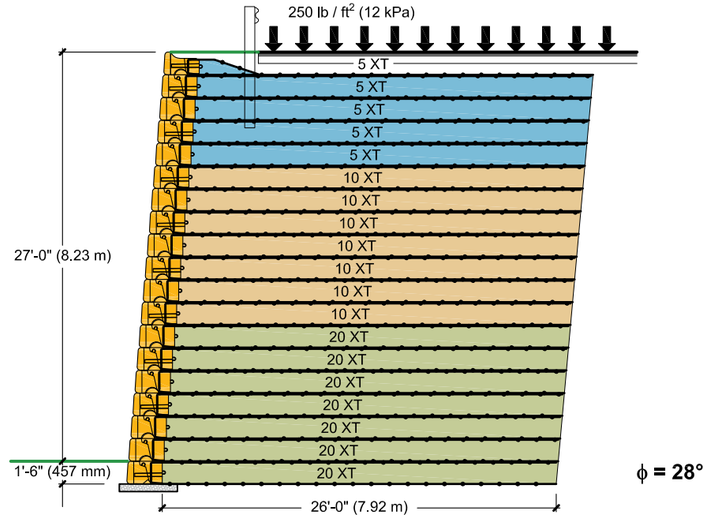
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

19 BLOCK SECTION
(19) 28" (710 mm) Blocks

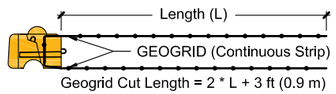
Geogrid Rolls Required per Wall Length		
Type	*Rolls / linear ft*	*Rolls / linear m*
5XT	± 0.43	± 1.42
10XT	± 0.61	± 1.99
20XT	± 0.61	± 1.99



Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

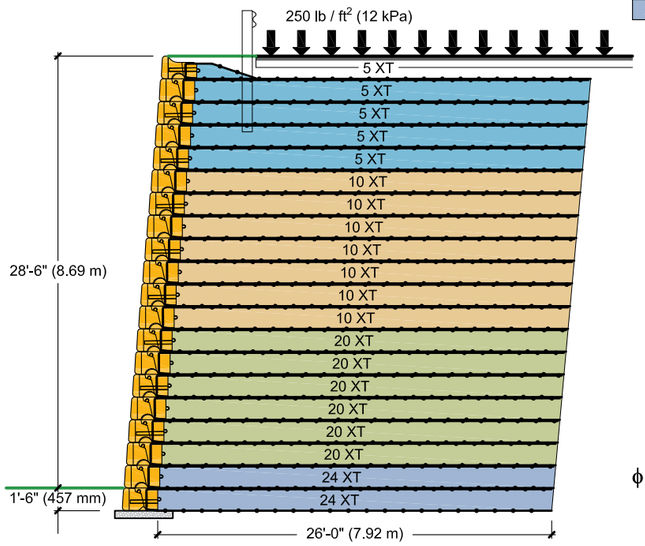
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION B | 250 lb/ft^2 (12 kPa) LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

20 BLOCK SECTION *
(20) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.43	± 1.42
10XT	± 0.61	± 1.99
20XT	± 0.52	± 1.71
24XT	± 0.17	± 0.57

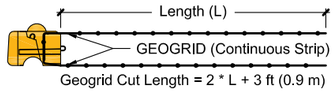


ϕ = 28°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Not tall enough? You can build significantly taller walls with the Redi-Rock PC System...we just had to stop the preliminary sections somewhere. Talk to your Engineer or give us a call for more info.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

AASHTO LOAD RESISTANCE FACTOR DESIGN

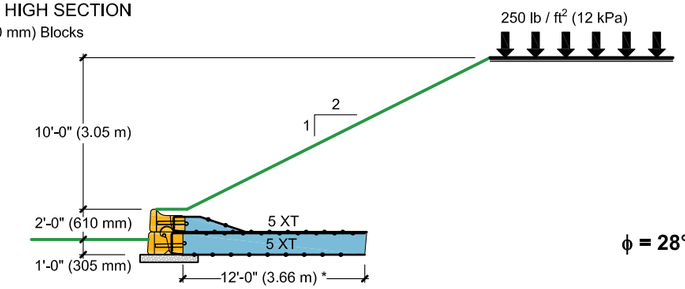
Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

2 BLOCK HIGH SECTION
(2) 28" (710 mm) Blocks

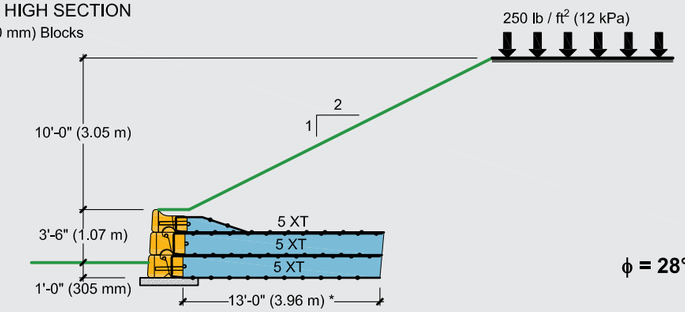
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.07	± 0.24



ϕ = 28°

3 BLOCK HIGH SECTION
(3) 28" (710 mm) Blocks

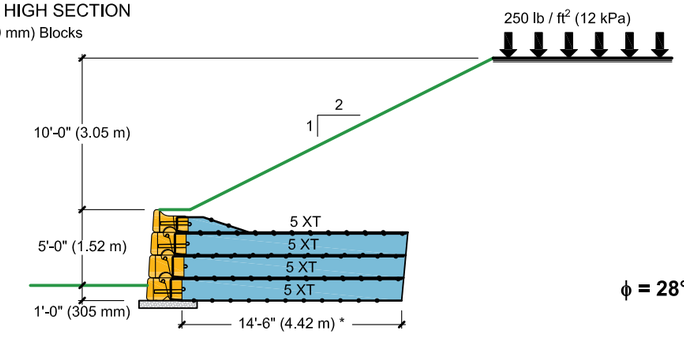
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.13	± 0.43



ϕ = 28°

4 BLOCK HIGH SECTION
(4) 28" (710 mm) Blocks

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.17	± 0.57

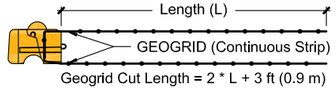


ϕ = 28°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

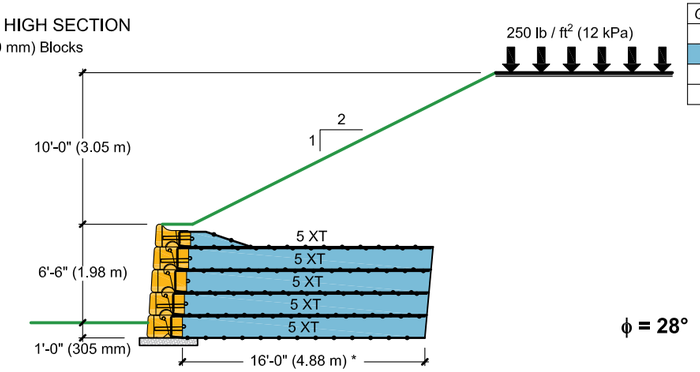
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

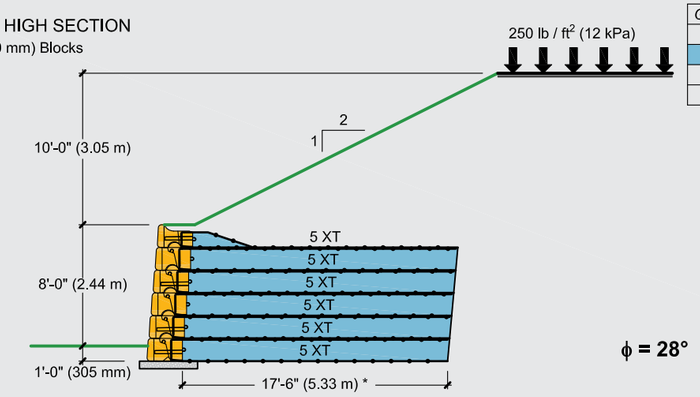
5 BLOCK HIGH SECTION
(5) 28" (710 mm) Blocks



Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85

ϕ = 28°

6 BLOCK HIGH SECTION
(6) 28" (710 mm) Blocks



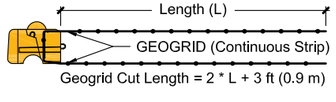
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.31	± 1.02

ϕ = 28°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

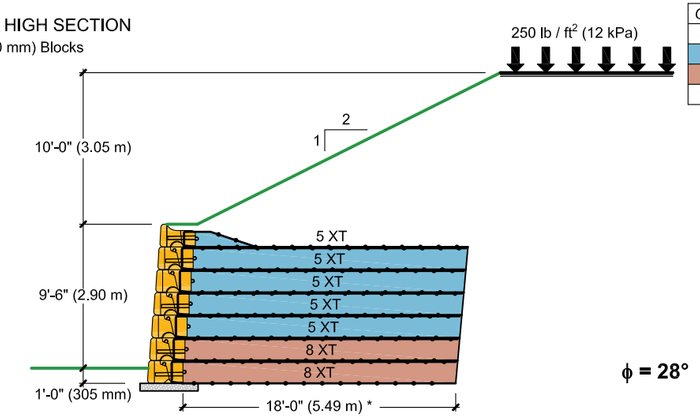
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

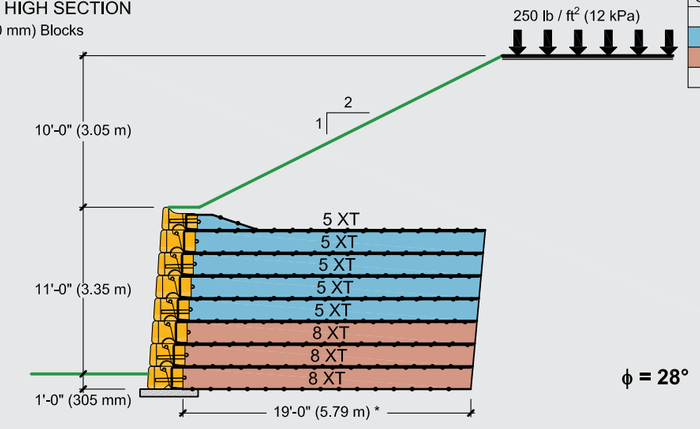
7 BLOCK HIGH SECTION
(7) 28" (710 mm) Blocks



Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
8XT	± 0.10	± 0.34

ϕ = 28°

8 BLOCK HIGH SECTION
(8) 28" (710 mm) Blocks



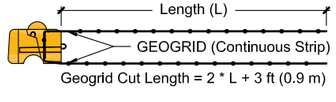
Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.33	± 1.07
8XT	± 0.20	± 0.64

ϕ = 28°

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

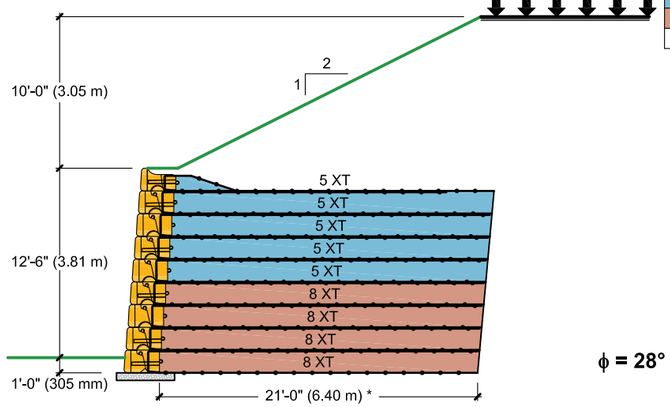
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

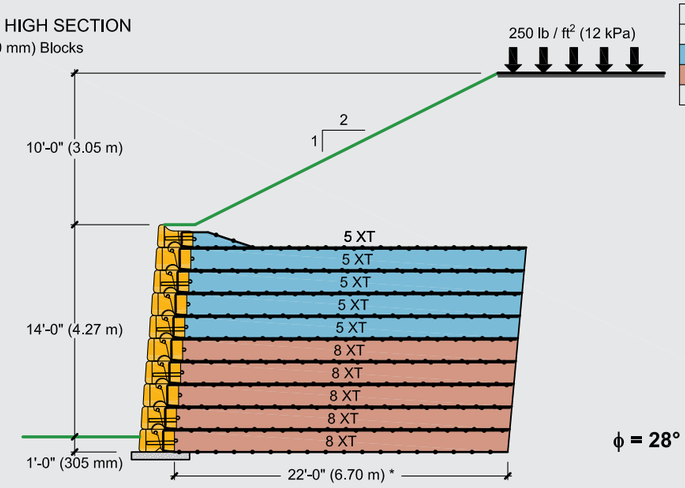
9 BLOCK HIGH SECTION
(9) 28" (710 mm) Blocks



ϕ = 28°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.33	± 1.07
8XT	± 0.26	± 0.85

10 BLOCK HIGH SECTION
(10) 28" (710 mm) Blocks



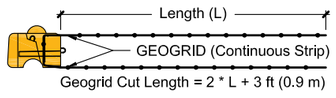
ϕ = 28°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.33	± 1.07
8XT	± 0.33	± 1.07

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

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POSITIVE CONNECTION SYSTEM WALLS

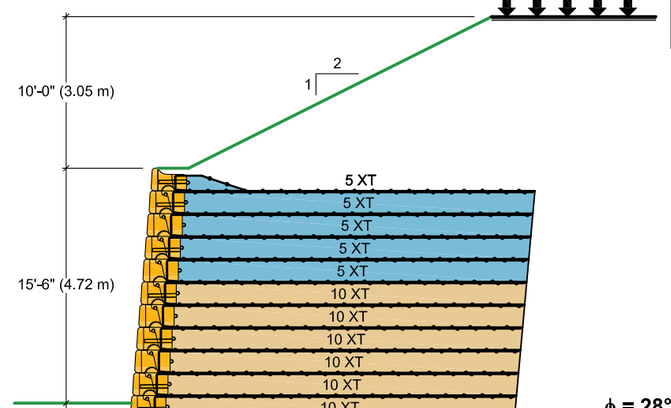
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

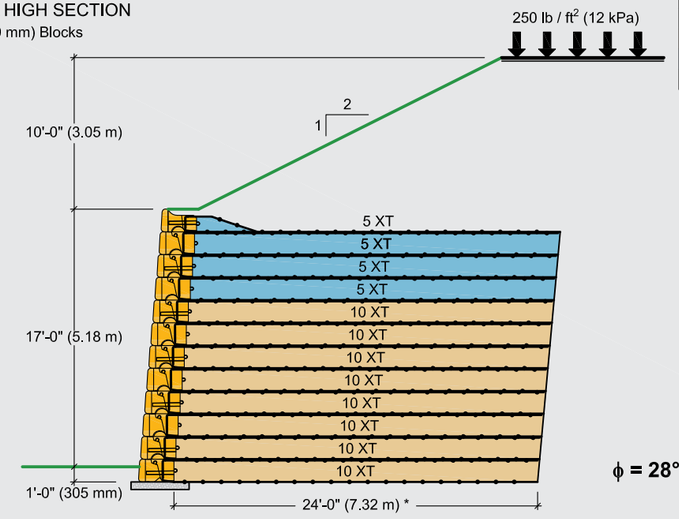
11 BLOCK HIGH SECTION
(11) 28" (710 mm) Blocks



ϕ = 28°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.33	± 1.07
10XT	± 0.39	± 1.28

12 BLOCK HIGH SECTION
(12) 28" (710 mm) Blocks



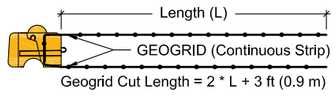
ϕ = 28°

Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.35	± 1.14
10XT	± 0.69	± 2.28

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

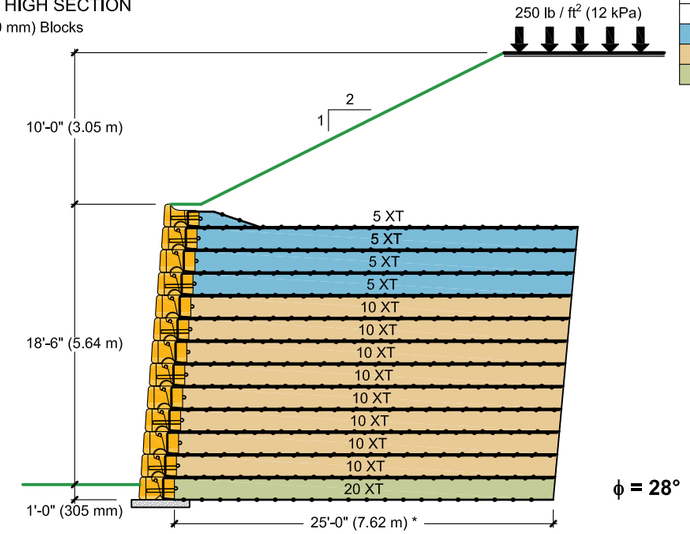
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

13 BLOCK HIGH SECTION
(13) 28" (710 mm) Blocks

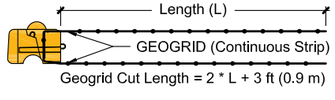


Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.35	± 1.14
10XT	± 0.69	± 2.28
20XT	± 0.09	± 0.28

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

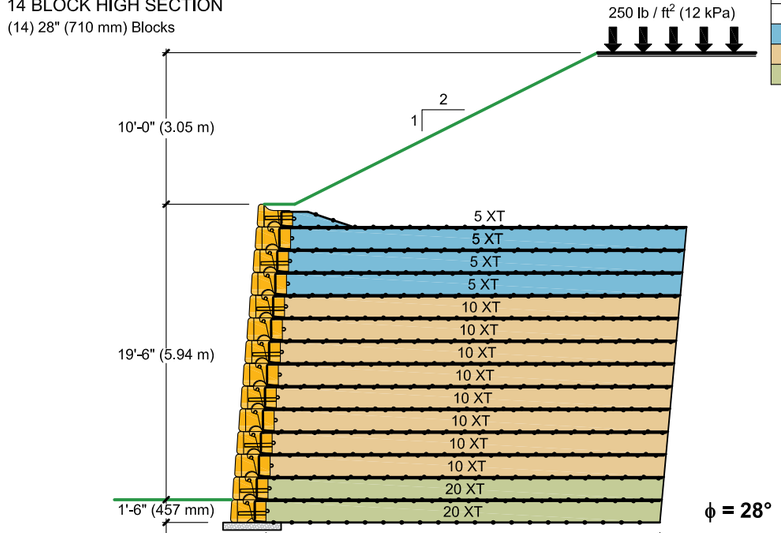
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

14 BLOCK HIGH SECTION
(14) 28" (710 mm) Blocks

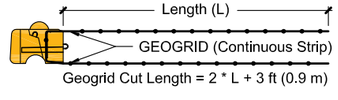


Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.35	± 1.14
10XT	± 0.69	± 2.28
20XT	± 0.17	± 0.57

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

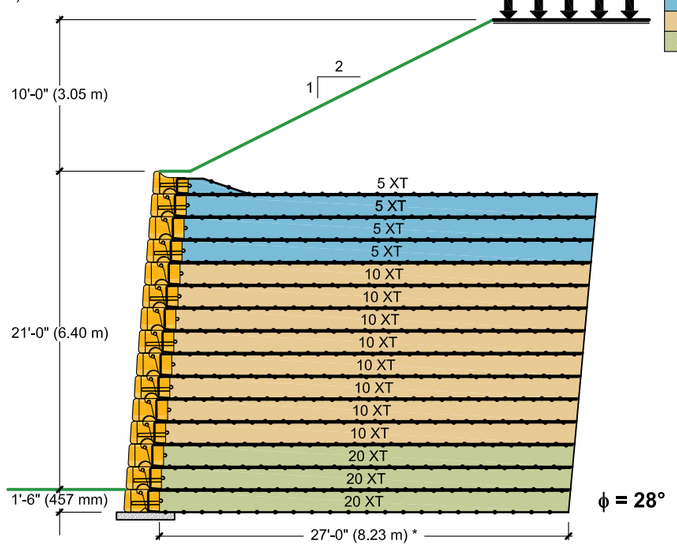
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

15 BLOCK HIGH SECTION
(15) 28" (710 mm) Blocks

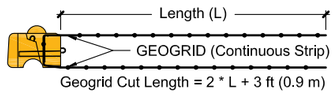


Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.35	± 1.14
10XT	± 0.69	± 2.28
20XT	± 0.26	± 0.85

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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POSITIVE CONNECTION SYSTEM WALLS

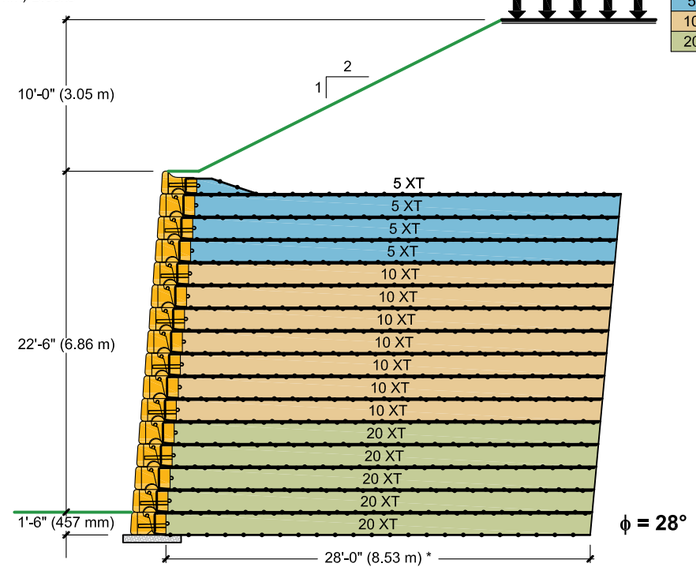
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

16 BLOCK HIGH SECTION
(16) 28" (710 mm) Blocks

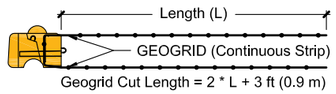


Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.35	± 1.14
10XT	± 0.61	± 1.99
20XT	± 0.43	± 1.42

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



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SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

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POSITIVE CONNECTION SYSTEM WALLS

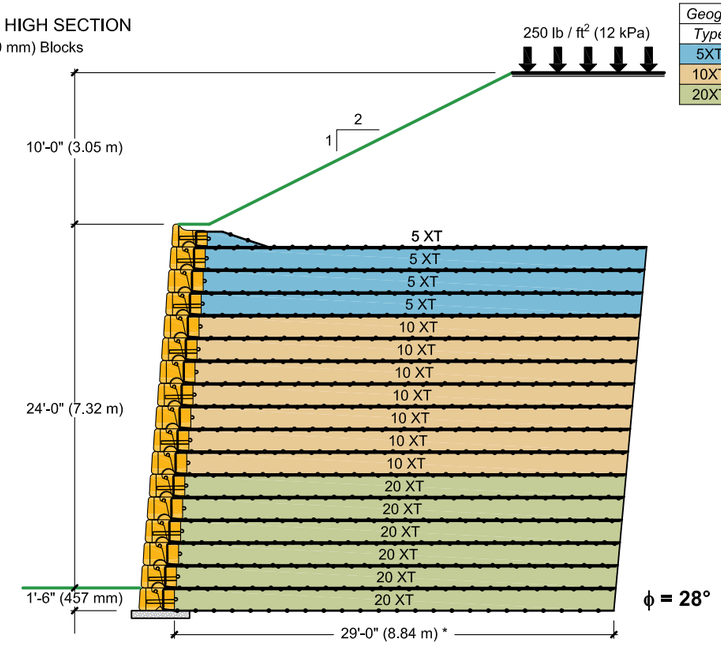
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

17 BLOCK HIGH SECTION
(17) 28" (710 mm) Blocks

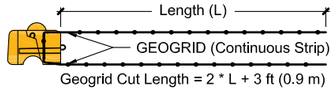


Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.35	± 1.14
10XT	± 0.61	± 1.99
20XT	± 0.52	± 1.71

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

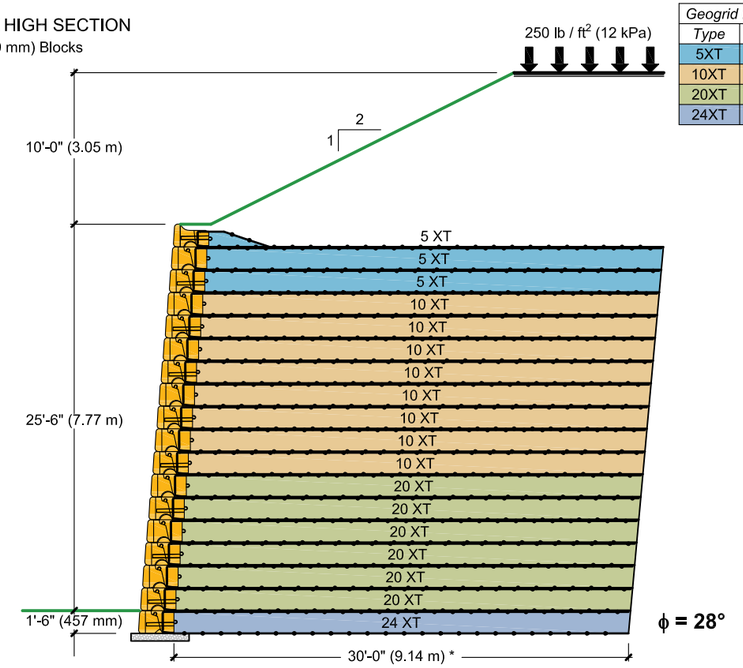
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

18 BLOCK HIGH SECTION
(18) 28" (710 mm) Blocks

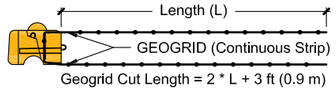


Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
10XT	± 0.69	± 2.28
20XT	± 0.52	± 1.71
24XT	± 0.09	± 0.28

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

redi-rock.com

POSITIVE CONNECTION SYSTEM WALLS

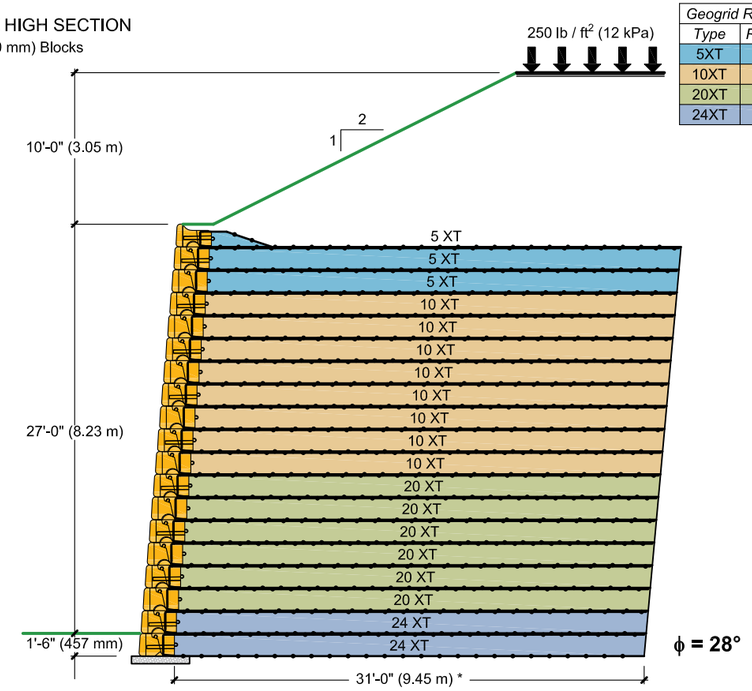
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

19 BLOCK HIGH SECTION
(19) 28" (710 mm) Blocks

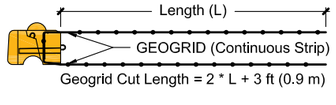


Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
5XT	± 0.26	± 0.85
10XT	± 0.69	± 2.28
20XT	± 0.52	± 1.71
24XT	± 0.17	± 0.57

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

POSITIVE CONNECTION SYSTEM WALLS

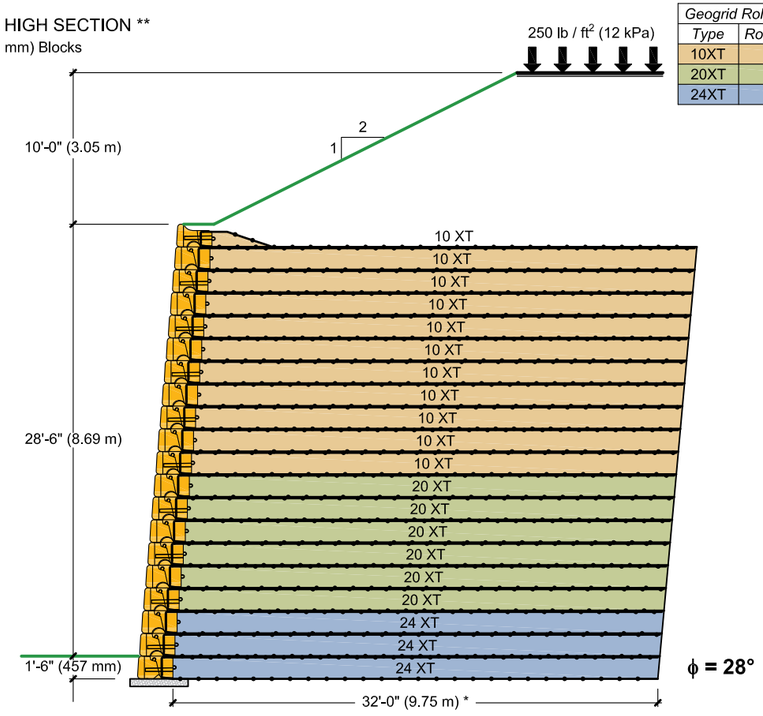
AASHTO LOAD RESISTANCE FACTOR DESIGN

Preliminary Reinforcement Schedule

ϕ = 28° | SILTY SAND or CLAYEY SAND

LOAD CONDITION CR | 1 : 2 CREST SLOPE, 10' (3.0 m) HIGH, 250 lb/ft^2 (12 kPa) SURCHARGE AT CREST, NO TOE SLOPE

20 BLOCK HIGH SECTION **
(20) 28" (710 mm) Blocks

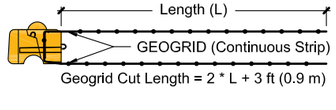


Geogrid Rolls Required per Wall Length		
Type	Rolls / linear ft	Rolls / linear m
10XT	± 1.43	± 4.69
20XT	± 0.78	± 2.56
24XT	± 0.39	± 1.28

Legend:

= 28" (710mm) BLOCK

= 41" (1030 mm) BLOCK



Geogrid shall be 12" (305 mm) wide strips of Mirafi geogrid, type as noted. Geogrid shall be **factory cut** and **certified** for width and strength by TenCate Mirafi.

*** Geogrid length primarily controlled by global stability. Length will change with crest height.**

**** Not tall enough? You can build significantly taller walls with the Redi-Rock PC System...we just had to stop the preliminary sections somewhere. Talk to your Engineer or give us a call for more info.**

SEE NOTES AND RECOMMENDED DETAILS AT START OF PRELIM. REINFORCEMENT SCHEDULE.

PRODUCT DATA SHEETS

Redi-Rock 28" (710 mm) Retaining Blocks

The Redi-Rock 28" (710mm) Retaining wall blocks are machine-placed, wet-cast, precast modular block units manufactured from first-purpose, non-reconstituted concrete and intended for use in the construction of dry-stacked modular retaining wall systems. The block units are manufactured from structural-grade concrete mixes in accordance with ASTM C94 or ASTM C685 that produce a finished unit with excellent resistance to freeze-thaw, deicing chemical exposure, and submerged conditions in both fresh water and salt water applications. All Redi-Rock Retaining wall products are manufactured and distributed through an international network of individually-owned, licensed precast concrete manufacturers.

DIMENSIONAL PROPERTIES

DIMENSIONS [1]	TOP	MIDDLE	BOTTOM	HALF TOP	HALF MIDDLE	HALF BOTTOM
HEIGHT (FRONT OF BLOCK)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)
HEIGHT (BACK OF BLOCK)	13 ± 3/16 (330 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	13 ± 3/16 (330 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)
LENGTH (FRONT OF BLOCK)	46 1/8 ± 1/2 (1172 ± 13)			22 13/16 ± 1/4 (579 ± 6)		
LENGTH (BACK OF BLOCK)	40 ± 1/2 (1016 ± 13)			16 13/16 ± 1/4 (427 ± 6)		
WIDTH	22 5/8 ± 1/2 (575 ± 13) FORM LINE TO BACK OF BLOCK AND ± 5 3/8 (136) FACE TEXTURE					
CONCRETE VOLUME	TOP	MIDDLE	BOTTOM	HALF TOP	HALF MIDDLE	HALF BOTTOM
LIMESTONE/COBBLESTONE FACE	±8.57 ft³ (0.243 m³)	±11.28 ft³ (0.319 m³)	±12.19 ft³ (0.345 m³)	±4.01 ft³ (0.113 m³)	±5.23 ft³ (0.148 m³)	±5.66 ft³ (0.160 m³)
LEDGESTONE FACE	±8.07 ft³ (0.229 m³)	±10.78 ft³ (0.305 m³)	±11.70 ft³ (0.331 m³)	±3.76 ft³ (0.106 m³)	±4.98 ft³ (0.141 m³)	±5.41 ft³ (0.153 m³)
SHIPPING/HANDLING WEIGHT [2]	TOP	MIDDLE	BOTTOM	HALF TOP	HALF MIDDLE	HALF BOTTOM
LIMESTONE/COBBLESTONE FACE	± 1229 lb (557 kg)	± 1613 lb (732 kg)	± 1744 lb (791 kg)	± 573 lb (260 kg)	± 748 lb (339 kg)	± 809 lb (367 kg)
LEDGESTONE FACE	± 1158 lb (525 kg)	± 1542 lb (699 kg)	± 1672 lb (758 kg)	± 538 lb (244 kg)	± 713 lb (323 kg)	± 774 lb (351 kg)

[1] All dimensions are *inches (mm)*.
[2] Weight shown is based on an assumed concrete unit weight of 143 lb/ft³ (2291 kg/m³). Actual weights will vary.

CONCRETE MIX PROPERTIES [3]

FREEZE THAW EXPOSURE CLASS [4]	MINIMUM 28 DAY COMPRESSIVE STRENGTH [5]	MAXIMUM WATER CEMENT RATIO	NOMINAL MAXIMUM AGGREGATE SIZE	AGGREGATE CLASS DESIGNATION [6]	AIR CONTENT [7]
MODERATE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3M	4.5% ± 1.5%
SEVERE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3S	6.0% ± 1.5%
VERY SEVERE	4,500 psi (30.0 MPa)	0.40	1 inch (25 mm)	4S	6.0% ± 1.5%
MAXIMUM WATER-SOLUBLE CHLORIDE ION (Cl^-) CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT [8,9]					0.15
MAXIMUM CHLORIDE AS Cl^- CONCENTRATION IN MIXING WATER, PARTS PER MILLION					1000
MAXIMUM PERCENTAGE OF TOTAL CEMENTITIOUS MATERIALS BY WEIGHT [10,12] (VERY SEVERE EXPOSURE CLASS ONLY)					
FLY ASH OR OTHER POZZOLANS CONFORMING TO ASTM C618					25
SLAG CONFORMING TO ASTM C989					50
SILICA FUME CONFORMING TO ASTM C1240					10
TOTAL OF FLY ASH OR OTHER POZZOLANS, SLAG, AND SILICA FUME [11]					50
TOTAL OF FLY ASH OR OTHER POZZOLANS AND SILICA FUME [11]					35

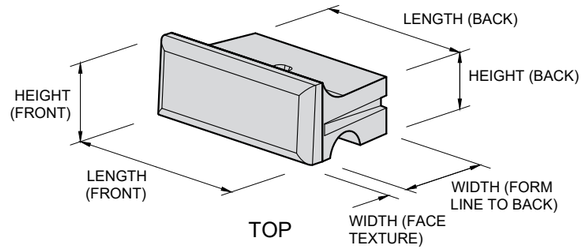
[3] Concrete mix properties are in general accordance with ACI 318 durability requirements. Research has shown that concrete manufactured to these standards demonstrates good durability and performance. When these requirements are followed, specific freeze-thaw testing of the concrete is typically NOT required.
[4] Exposure class is as described in ACI 318. "MODERATE" describes concrete that is exposed to freezing and thawing cycles and occasional exposure to moisture. "SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture. "VERY SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture and exposed to deicing chemicals. Exposure class should be specified by owner/purchaser prior to order placement. Longer lead times may be required for block units manufactured for "severe" and "very severe" exposure classes.
[5] Test method ASTM C39.
[6] Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete.*
[7] Test method ASTM C231.
[8] Test method ASTM C1218 at age between 28 and 42 days.
[9] Where used in high sulfate environments or where alkali-silica reactivity is an issue, water soluble chloride shall be limited to no more than trace amounts (from impurities in concrete-making components, not intended constituents.)
[10] The total cementitious material also includes ASTM C150, C595, C845, and C1157 cement. The maximum percentages shall include:
(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.
(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.
(c) Silica fume, ASTM C1240, present in a blended cement.
[11] Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.
[12] Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze/thaw durability in a detailed and current testing program.

Redi-Rock 28" (710 mm) Retaining Blocks

DESIGN PROPERTIES

HORIZONTAL SETBACK / WALL FACE BATTER OPTIONS		BLOCK TO BLOCK INTERFACE SHEAR [12]
10 inch (254 mm) KNOB	1 5/8 inch (41 mm) PER BLOCK COURSE (5.2° BATTER)	V = 6,061 + N tan 44° ≤ 11,276 lb/ft (88.4 + N tan 44° ≤ 164.5 kN/m)
7 1/2 inch (190 mm) KNOB	3/8 inch (10 mm) PER BLOCK COURSE (1.2° BATTER)	V = 1,178 + N tan 54° ≤ 10,970 lb/ft (17.2 + N tan 54° ≤ 160.1 kN/m)
6 3/4 inch (171 mm) KNOB	NO SETBACK (NO BATTER) [11]	V = 1,178 + N tan 54° ≤ 10,970 lb/ft (17.2 + N tan 54° ≤ 160.1 kN/m)
INFILLED UNIT WEIGHT FOR WALL STABILITY CALCULATIONS [13]		
LIMESTONE / COBBLESTONE BLOCKS	127 lb/ft³ (2082 kg/m³)	
LEDGESTONE BLOCKS	122 lb/ft³ (1954 kN/m³)	
MINIMUM CONSTRUCTION RADIUS [14]		
CONCAVE CURVE	14 ft 6 in (4.42 m)	
CONVEX CURVE	14 ft 6 in (4.42 m)	

[11] Special consideration should be given to the design of vertical retaining walls subject to active lateral earth pressure.
[12] Values based on full scale testing performed in October 2011. Copies of the full test reports are available at www.redi-rock.com.
[13] The infilled unit weights shown here are based on an assumed concrete unit weight of 143 lb/ft³ (2291 kg/m³) and an assumed soil unit weight of 100 lb/ft³ (1602 kN/m³). They are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis.
[14] The minimum construction radius stated is applicable to both concave and convex curved retaining wall sections. Increases to this minimum radius are required to account for wall batter. Special consideration should be given to block selection, facing batter, and wall height when selecting the minimum radius for the final wall alignment.



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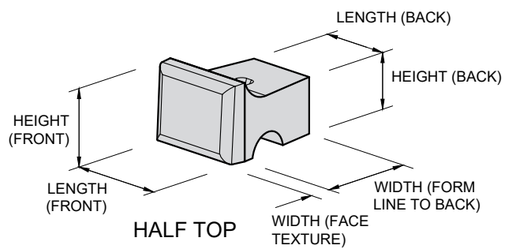

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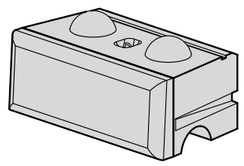
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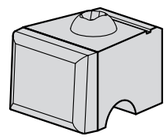
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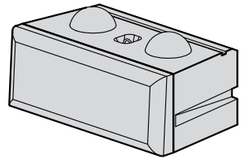
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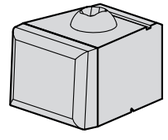

HALF BOTTOM

Revised 110518

Redi-Rock 41" (1030 mm) Retaining Blocks

The Redi-Rock 41" (1030mm) Retaining wall blocks are machine-placed, wet-cast, precast modular block units manufactured from first-purpose, non-reconstituted concrete and intended for use in the construction of dry-stacked modular retaining wall systems. The block units are manufactured from structural-grade concrete mixes in accordance with ASTM C94 or ASTM C685 that produce a finished unit with excellent resistance to freeze-thaw, deicing chemical exposure, and submerged conditions in both fresh water and salt water applications. All Redi-Rock Retaining wall products are manufactured and distributed through an international network of individually-owned, licensed precast concrete manufacturers.

DIMENSIONAL PROPERTIES

DIMENSIONS [1]	TOP	MIDDLE	BOTTOM	HALF TOP	HALF MIDDLE	HALF BOTTOM
HEIGHT (FRONT OF BLOCK)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)
HEIGHT (BACK OF BLOCK)	13 ± 3/16 (330 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	13 ± 3/16 (330 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)
LENGTH (FRONT OF BLOCK)	46 1/8 ± 1/2 (1172 ± 13)			22 13/16 ± 1/4 (579 ± 6)		
LENGTH (BACK OF BLOCK)	36 5/8 ± 1/2 (930 ± 13)			13 9/16 ± 1/4 (344 ± 6)		
WIDTH	35 1/8 ± 1/2 (892 ± 13) FORM LINE TO BACK OF BLOCK AND ± 5 3/8 (136) FACE TEXTURE					
CONCRETE VOLUME	BOTTOM	MIDDLE	BOTTOM	HALF MIDDLE	HALF MIDDLE	HALF BOTTOM
LIMESTONE/COBBLESTONE FACE	±12.22 ft³ (0.346 m³)	±16.14 ft³ (0.457 m³)	±17.06 ft³ (0.483 m³)	±5.38 ft³ (0.15 m³)	±7.14 ft³ (0.202 m³)	±7.58 ft³ (0.214 m³)
LEDGESTONE FACE	±11.73 ft³ (0.332 m³)	±15.65 ft³ (0.443 m³)	±16.56 ft³ (0.469 m³)	±5.14 ft³ (0.15 m³)	±6.90 ft³ (0.195 m³)	±7.33 ft³ (0.208 m³)
SHIPPING/HANDLING WEIGHT [2]		MIDDLE	BOTTOM	HALF MIDDLE	HALF MIDDLE	HALF BOTTOM
LIMESTONE/COBBLESTONE FACE	± 1748 lb (793 kg)	± 2309 lb (1047 kg)	± 2439 lb (1106 kg)	± 770 lb (350 kg)	± 1022 lb (463 kg)	±1083 lb (491 kg)
LEDGESTONE FACE	± 1677 lb (760 kg)	± 2237 lb (1015 kg)	± 2368 lb (1074 kg)	± 735 lb (333 kg)	± 987 lb (448 kg)	± 1048 lb (475 kg)

[1] All dimensions are *inches (mm)*.
[2] Weight shown is based on an assumed concrete unit weight of 143 lb/ft³ (2291 kg/m³). Actual weights will vary.

CONCRETE MIX PROPERTIES [3]

FREEZE THAW EXPOSURE CLASS [4]	MINIMUM 28 DAY COMPRESSIVE STRENGTH [5]	MAXIMUM WATER CEMENT RATIO	NOMINAL MAXIMUM AGGREGATE SIZE	AGGREGATE CLASS DESIGNATION [6]	AIR CONTENT [7]
MODERATE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3M	4.5% ± 1.5%
SEVERE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3S	6.0% ± 1.5%
VERY SEVERE	4,500 psi (30.0 MPa)	0.40	1 inch (25 mm)	4S	6.0% ± 1.5%
MAXIMUM WATER-SOLUBLE CHLORIDE ION (Cl^-) CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT [8,9]					0.15
MAXIMUM CHLORIDE AS Cl^- CONCENTRATION IN MIXING WATER, PARTS PER MILLION					1000
MAXIMUM PERCENTAGE OF TOTAL CEMENTITIOUS MATERIALS BY WEIGHT [10,12] (VERY SEVERE EXPOSURE CLASS ONLY)					
FLY ASH OR OTHER POZZOLANS CONFORMING TO ASTM C618					25
SLAG CONFORMING TO ASTM C989					50
SILICA FUME CONFORMING TO ASTM C1240					10
TOTAL OF FLY ASH OR OTHER POZZOLANS, SLAG, AND SILICA FUME [12]					50
TOTAL OF FLY ASH OR OTHER POZZOLANS AND SILICA FUME [12]					35
ALKALI-AGGREGATE REACTIVITY MITIGATION PER ACI 201					

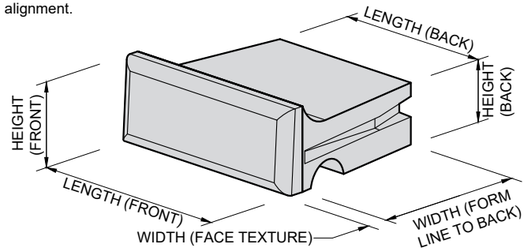
[3] Concrete mix properties are in general accordance with ACI 318 durability requirements. Research has shown that concrete manufactured to these standards demonstrates good durability and performance. When these requirements are followed, specific freeze-thaw testing of the concrete is typically NOT required.
[4] Exposure class is as described in ACI 318. "MODERATE" describes concrete that is exposed to freezing and thawing cycles and occasional exposure to moisture. "SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture. "VERY SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture and exposed to deicing chemicals. Exposure class should be specified by owner/purchaser prior to order placement. Longer lead times may be required for block units manufactured for "severe" and "very severe" exposure classes.
[5] Test method ASTM C39.
[6] Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete.*
[7] Test method ASTM C231.
[8] Test method ASTM C1218 at age between 28 and 42 days.
[9] Where used in high sulfate environments or where alkali-silica reactivity is an issue, water soluble chloride shall be limited to no more than trace amounts (from impurities in concrete-making components, not intended constituents.)
[10] The total cementitious material also includes ASTM C150, C595, C845, and C1157 cement. The maximum percentages shall include:
(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.
(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.
(c) Silica fume, ASTM C1240, present in a blended cement.
[11] Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.
[12] Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze/thaw durability in a detailed and current testing program.

Redi-Rock 41" (1030 mm) Retaining Blocks

DESIGN PROPERTIES

HORIZONTAL SETBACK / WALL FACE BATTER OPTIONS		BLOCK TO BLOCK INTERFACE SHEAR [13]
10 inch (254 mm) KNOB	1 5/8 inch (41 mm) PER BLOCK COURSE (5.2° BATTER)	V = 6,061 + N tan 44° ≤ 11,276 lb/ft (88.4 + N tan 44° ≤ 164.5 kN/m)
7 1/2 inch (190 mm) KNOB	3/8 inch (10 mm) PER BLOCK COURSE (1.2° BATTER)	V = 1,178 + N tan 54° ≤ 10,970 lb/ft (17.2 + N tan 54° ≤ 160.1 kN/m)
6 3/4 inch (171 mm) KNOB	NO SETBACK (NO BATTER) [12]	V = 1,178 + N tan 54° ≤ 10,970 lb/ft (17.2 + N tan 54° ≤ 160.1 kN/m)
INFILLED UNIT WEIGHT FOR WALL STABILITY CALCULATIONS [14]		
LIMESTONE / COBBLESTONE BLOCKS		130 lb/ft³ (2082 kg/m³)
LEDGESTONE BLOCKS		126 lb/ft³ (2018 kg/m³)
MINIMUM CONSTRUCTION RADIUS [15]		
CONCAVE CURVE		14 ft 6 in (4.42 m)
CONVEX CURVE		14 ft 6 in (4.42 m)

[12] Special consideration should be given to the design of vertical retaining walls subject to active lateral earth pressure.
[13] Values based on full scale testing performed in October 2011. Copies of the full test reports are available at www.redi-rock.com.
[14] The infilled unit weights shown here are based on an assumed concrete unit weight of 143 lb/ft³ (2291 kg/m³) and an assumed soil unit weight of 100 lb/ft³ (1602 kg/m³). They are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis.
[15] The minimum construction radius stated is applicable to both concave and convex curved retaining wall sections. Increases to this minimum radius are required to account for wall batter. Special consideration should be given to block selection, facing batter, and wall height when selecting the minimum radius for the final wall alignment.



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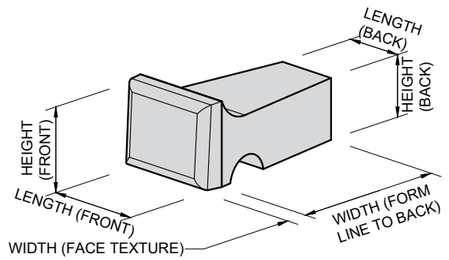

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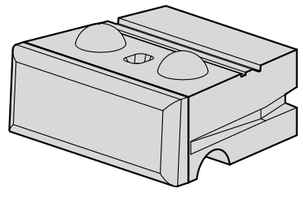
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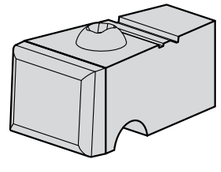
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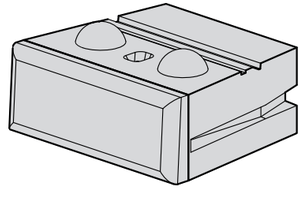
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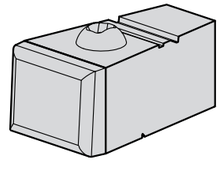

HALF BOTTOM

Redi-Rock 60" (1520 mm) Retaining Blocks

The Redi-Rock 60" (1520mm) Retaining wall blocks are machine-placed, wet-cast, precast modular block units manufactured from first-purpose, non-reconstituted concrete and intended for constructing dry-stacked modular retaining wall systems. The block units are manufactured from structural-grade concrete mixes in accordance with ASTM C94 or ASTM C685 that produce a finished unit with excellent resistance to freeze-thaw, deicing chemical exposure, and submerged conditions in both fresh water and salt water applications. All Redi-Rock Retaining wall products are manufactured and distributed through an international network of individually-owned, licensed precast concrete manufacturers.

DIMENSIONAL PROPERTIES

DIMENSIONS [1]	MIDDLE	BOTTOM	HALF MIDDLE	HALF BOTTOM
HEIGHT (FRONT OF BLOCK)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)
HEIGHT (BACK OF BLOCK)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)
LENGTH (FRONT OF BLOCK)	46 1/8 ± 1/2 (1172 ± 13)		46 1/8 ± 1/2 (1172 ± 13)	
LENGTH (BACK OF BLOCK)	31 3/8 ± 1/2 (797 ± 13)		8 3/8 ± 1/2 (231 ± 13)	
WIDTH	54 5/8 ± 1/2 (1387 ± 13) PLUS ± 5 3/8 (136) FACE TEXTURE		54 5/8 ± 1/2 (1387 ± 13) PLUS ± 5 3/8 (136) FACE TEXTURE	
CONCRETE VOLUME	MIDDLE	BOTTOM	HALF MIDDLE	HALF BOTTOM
LIMESTONE/COBBLESTONE FACE	± 23.00 ft^3 (0.651 m^3)	± 23.90 ft^3 (0.677 m^3)	± 9.34 ft^3 (0.264 m^3)	± 9.77 ft^3 (0.277 m^3)
LEDGESTONE FACE	± 22.49 ft^3 (0.637 m^3)	± 23.40 ft^3 (0.663 m^3)	± 9.09 ft^3 (0.258 m^3)	± 9.52 ft^3 (0.270 m^3)
SHIPPING/HANDLING WEIGHT [2]	MIDDLE	BOTTOM	HALF MIDDLE	HALF BOTTOM
LIMESTONE/COBBLESTONE FACE	± 3287 lb (1491 kg)	± 3418 lb (1550 kg)	±1335 lb (606 kg)	± 1397 lb (633 kg)
LEDGESTONE FACE	± 3216 lb (1458 kg)	± 3346 lb (1518 kg)	± 1300 lb (590 kg)	± 1364 lb (618 kg)

[1] All dimensions are *inches (mm)*.
[2] Weight shown is based on an assumed concrete unit weight of 143 lb/ft^3 (2291 kg/m^3). Actual weights will vary.

CONCRETE MIX PROPERTIES [3]

FREEZE THAW EXPOSURE CLASS [4]	MINIMUM 28 DAY COMPRESSIVE STRENGTH [5]	MAXIMUM WATER CEMENT RATIO	NOMINAL MAXIMUM AGGREGATE SIZE	AGGREGATE CLASS DESIGNATION [6]	AIR CONTENT [7]
MODERATE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3M	4.5% ± 1.5%
SEVERE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3S	6.0% ± 1.5%
VERY SEVERE	4,500 psi (30.0 MPa)	0.40	1 inch (25 mm)	4S	6.0% ± 1.5%
MAXIMUM WATER-SOLUBLE CHLORIDE ION (Cl^-) CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT [8,9]					0.15
MAXIMUM CHLORIDE AS Cl^- CONCENTRATION IN MIXING WATER, PARTS PER MILLION					1000
MAXIMUM PERCENTAGE OF TOTAL CEMENTITIOUS MATERIALS BY WEIGHT [10,12] (VERY SEVERE EXPOSURE CLASS ONLY)					
FLY ASH OR OTHER POZZOLANS CONFORMING TO ASTM C618					25
SLAG CONFORMING TO ASTM C989					50
SILICA FUME CONFORMING TO ASTM C1240					10
TOTAL OF FLY ASH OR OTHER POZZOLANS, SLAG, AND SILICA FUME [11]					50
TOTAL OF FLY ASH OR OTHER POZZOLANS AND SILICA FUME [11]					35
ALKALI-AGGREGATE REACTIVITY MITIGATION PER ACI 201					

[3] Concrete mix properties are in general accordance with ACI 318 durability requirements. Research has shown that concrete manufactured to these standards demonstrates good durability and performance. When these requirements are followed, specific freeze-thaw testing of the concrete is typically NOT required.
[4] Exposure class is as described in ACI 318. "MODERATE" describes concrete that is exposed to freezing and thawing cycles and occasional exposure to moisture. "SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture. "VERY SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture and exposed to deicing chemicals. Exposure class should be specified by owner/purchaser prior to order placement. Longer lead times may be required for block units manufactured for "severe" and "very severe" exposure classes.
[5] Test method ASTM C39.
[6] Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete.*
[7] Test method ASTM C231.
[8] Test method ASTM C1218 at age between 28 and 42 days.
[9] Where used in high sulfate environments or where alkali-silica reactivity is an issue, water soluble chloride shall be limited to no more than trace amounts (from impurities in concrete-making components, not intended constituents.)
[10] The total cementitious material also includes ASTM C150, C595, C845, and C1157 cement. The maximum percentages shall include:
(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.
(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.
(c) Silica fume, ASTM C1240, present in a blended cement.
[11] Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.
[12] Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze/thaw durability in a detailed and current testing program.

Redi-Rock 60" (1520 mm) Retaining Blocks

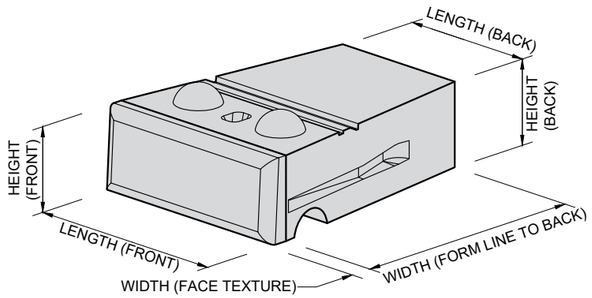
DESIGN PROPERTIES

HORIZONTAL SETBACK / WALL FACE BATTER OPTIONS		BLOCK TO BLOCK INTERFACE SHEAR [13]
10 inch (254 mm) KNOB	1 5/8 inch (41 mm) PER BLOCK COURSE (5.2° BATTER)	V = 6,061 + N tan 44° ≤ 11,276 lb/ft (88.4 + N tan 44° ≤ 164.5 kN/m)
7 1/2 inch (190 mm) KNOB	3/8 inch (10 mm) PER BLOCK COURSE (1.2° BATTER)	V = 1,178 + N tan 54° ≤ 10,970 lb/ft (17.2 + N tan 54° ≤ 160.1 kN/m)
6 3/4 inch (171 mm) KNOB	NO SETBACK (NO BATTER) [12]	V = 1,178 + N tan 54° ≤ 10,970 lb/ft (17.2 + N tan 54° ≤ 160.1 kN/m)

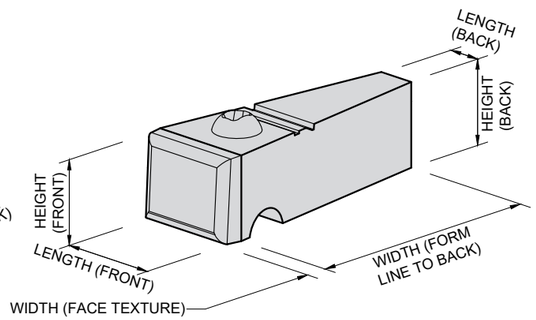
INFILLED UNIT WEIGHT FOR WALL STABILITY CALCULATIONS [14]	60" (1520) BOTTOM RETAINING UNIT	60" (1520) MIDDLE RETAINING UNIT
LIMESTONE / COBBLESTONE BLOCKS	134 lb/ft^3 (2146 kg/m^3)	130 lb/ft^3 (2082 kg/m^3)
LEDGESTONE BLOCKS	132 lb/ft^3 (2114 kg/m^3)	128 lb/ft^3 (2050 kg/m^3)

MINIMUM CONSTRUCTION RADIUS [15]	
CONCAVE CURVE	14 ft 6 in (4.42 m)
CONVEX CURVE	14 ft 6 in (4.42 m)

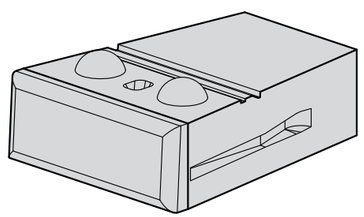
[12] Special consideration should be given to the design of vertical retaining walls subject to active lateral earth pressure.
[13] Values based on full scale testing performed in October 2011. Copies of the full test reports are available at www.redi-rock.com.
[14] The infilled unit weights shown here are based on full width units and an assumed concrete unit weight of 143 lb/ft^3 (2291 kg/m^3) and an assumed soil unit weight of 100 lb/ft^3 (1602 kg/m^3). They are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis.
[15] The minimum construction radius stated is applicable to both concave and convex curved retaining wall sections. Increases to this minimum radius are required to account for wall batter. Special consideration should be given to block selection, facing batter, and wall height when selecting the minimum radius for the final wall alignment.



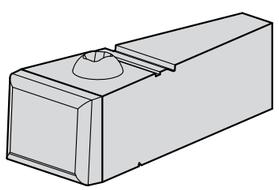
MIDDLE - 60" (1520)



HALF MIDDLE - 60" (1520)



BOTTOM - 60" (1520)



HALF BOTTOM - 60" (1520)

R-5236HC 52" (1,320 mm) Hollow-Core Retaining Blocks

The Redi-Rock 52" (1,320 mm) XL retaining wall blocks are machine-placed, wet-cast, precast modular block units manufactured from first-purpose, non-reconstituted concrete and intended for use in the construction of dry-stacked modular retaining wall systems. The block units are manufactured from structural-grade concrete mixes in accordance with ASTM C94 or ASTM C685 that produce a finished unit with excellent resistance to freeze-thaw, deicing chemical exposure, and submerged conditions in both fresh water and salt water applications. All Redi-Rock retaining wall products are manufactured and distributed through an international network of individually-owned, licensed precast concrete manufacturers.

DIMENSIONAL PROPERTIES

DIMENSIONS [1]	FULL BLOCK	HALF BLOCK
HEIGHT (FRONT OF BLOCK)	36 + 3/16 (914 + 5)	36 + 3/16 (914 + 5)
HEIGHT (BACK OF BLOCK)	36 ± 3/16 (914 ± 5)	36 ± 3/16 (914 ± 5)
LENGTH (FRONT OF BLOCK)	46 1/8 ± 1/2 (1172 ± 13)	23 1/16 ± 1/2 (586 ± 13)
LENGTH (BACK OF BLOCK)	31 ± 1/2 (787 ± 13)	16 11/16 ± 1/2 (423 ± 13)
WIDTH	46 5/8 ± 1/2 (1184 ± 13) FORM LINE TO BACK OF BLOCK AND 5 3/8 (136) ± FACE TEXTURE	
CONCRETE VOLUME	FULL BLOCK	HALF BLOCK
LEDGESTONE FACE	23.29 ft^3 (0.660 m^3)±	17.93 ft^3 (0.508 m^3)±
SHIPPING/HANDLING WEIGHT [2]	FULL BLOCK	HALF BLOCK
LEDGESTONE FACE	3330 lb (1510 kg)±	2560 lb (1160 kg)±

[1] All dimensions are *inches (mm)*.
[2] Weight shown is based on an assumed concrete unit weight of 143 lb/ft^3 (2291 kg/m^3). Actual weights will vary.

CONCRETE MIX PROPERTIES [3]

FREEZE THAW EXPOSURE CLASS [4]	MINIMUM 28 DAY COMPRESSIVE STRENGTH [5]	MAXIMUM WATER CEMENT RATIO	NOMINAL MAXIMUM AGGREGATE SIZE	AGGREGATE CLASS DESIGNATION [6]	AIR CONTENT [7]
MODERATE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3M	4.5% ± 1.5%
SEVERE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3S	6.0% ± 1.5%
VERY SEVERE	4,500 psi (30.0 MPa)	0.40	1 inch (25 mm)	4S	6.0% ± 1.5%
MAXIMUM WATER-SOLUBLE CHLORIDE ION (Cl^-) CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT [8,9]					0.15
MAXIMUM CHLORIDE AS Cl^- CONCENTRATION IN MIXING WATER, PARTS PER MILLION					1000
MAXIMUM PERCENTAGE OF TOTAL CEMENTITIOUS MATERIALS BY WEIGHT [10,12] (VERY SEVERE EXPOSURE CLASS ONLY)					
FLY ASH OR OTHER POZZOLANS CONFORMING TO ASTM C618					25
SLAG CONFORMING TO ASTM C989					50
SILICA FUME CONFORMING TO ASTM C1240					10
TOTAL OF FLY ASH OR OTHER POZZOLANS, SLAG, AND SILICA FUME [11]					50
TOTAL OF FLY ASH OR OTHER POZZOLANS AND SILICA FUME [11]					35
ALKALI-AGGREGATE REACTIVITY MITIGATION per ACI 201					

[3] Concrete mix properties are in general accordance with ACI 318 durability requirements. Research has shown that concrete manufactured to these standards demonstrates good durability and performance. When these requirements are followed, specific freeze-thaw testing of the concrete is typically NOT required.
[4] Exposure class is as described in ACI 318. "MODERATE" describes concrete that is exposed to freezing and thawing cycles and occasional exposure to moisture. "SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture. "VERY SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture and exposed to deicing chemicals. Exposure class should be specified by owner/purchaser prior to order placement. Longer lead times may be required for block units manufactured for "severe" and "very severe" exposure classes.
[5] Test method ASTM C39.
[6] Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete.*
[7] Test method ASTM C231.
[8] Test method ASTM C1218 at age between 28 and 42 days.
[9] Where used in high sulfate environments or where alkali-silica reactivity is an issue, water soluble chloride shall be limited to no more than trace amounts (from impurities in concrete-making components, not intended constituents.)
[10] The total cementitious material also includes ASTM C150, C595, C845, and C1157 cement. The maximum percentages shall include:
(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.
(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.
(c) Silica fume, ASTM C1240, present in a blended cement.
[11] Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.
[12] Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze/thaw durability in a detailed and current testing program.

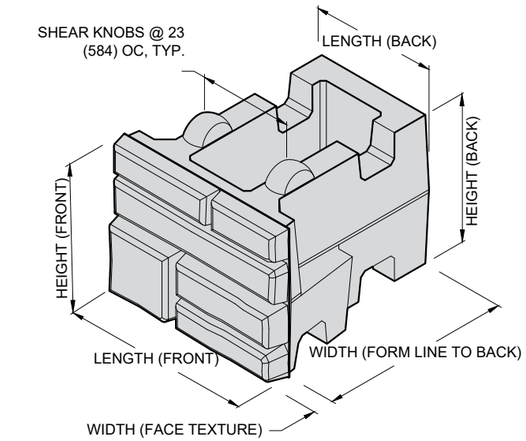
R-5236HC 52" (1,320 mm) Hollow-Core Retaining Blocks

DESIGN PROPERTIES

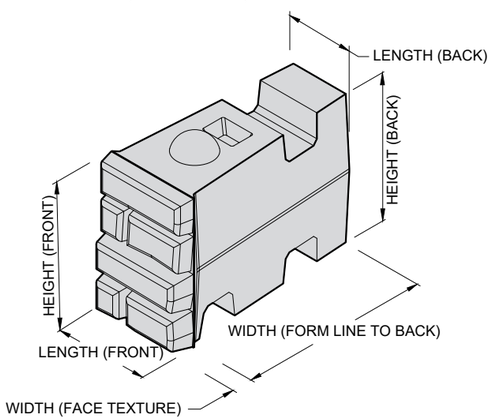
HORIZONTAL SETBACK / WALL FACE BATTER	BLOCK TO BLOCK INTERFACE SHEAR [13]	
	$S_{p(1)}$ = 4547 lb/ft + N tan 44° (66.4 kN/m + N tan 44°)	for N < 7017 lb/ft (N < 102.4 kN/m)
3 1/4 inches (83 mm) PER COURSE	$S_{p(2)}$ = 8488 lb/ft + N tan 22° (123.9 kN/m + N tan 22°)	for 7017 ≤ N < 16,118 lb/ft (102.4 ≤ N < 235.2 kN/m)
(5.2° BATTER)	$S_{p(max)}$ = 15,000 lb/ft (218.9 kN/m)	for N ≥ 16,118 lb/ft (N ≥ 235.2 kN/m)
INFILLED UNIT WEIGHT FOR WALL STABILITY CALCULATIONS [14]		
LEDGESTONE FACE	112 lb/ft^3 (1801 kN/m^3)	
MINIMUM CONSTRUCTION RADIUS [15]		
CONCAVE CURVE	14 ft - 6 in (4.42 m)	
CONVEX CURVE	14 ft - 6 in (4.42 m)	

[13] Values based on full scale testing performed in 2017 and 2018. Copies of the full test reports are available at www.redi-rock.com.
[14] The infilled unit weights shown here are based on an assumed concrete unit weight of 143 lb/ft^3 (2291 kg/m^3) and an assumed soil unit weight of 100 lb/ft^3 (1602 kN/m^3). They are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis.
[15] The minimum construction radius stated is applicable to both concave and convex curved retaining wall sections. Increases to this minimum radius are required to account for wall batter. Special consideration should be given to block selection, facing batter, and wall height when selecting the minimum radius for the final wall alignment.

FULL BLOCK



HALF BLOCK



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R-7236HC 72" (1,830 mm) Hollow-Core Retaining Blocks

The Redi-Rock 72" (1,830 mm) XL retaining wall blocks are machine-placed, wet-cast, precast modular block units manufactured from first-purpose, non-reconstituted concrete and intended for use in the construction of dry-stacked modular retaining wall systems. The block units are manufactured from structural-grade concrete mixes in accordance with ASTM C94 or ASTM C685 that produce a finished unit with excellent resistance to freeze-thaw, deicing chemical exposure, and submerged conditions in both fresh water and salt water applications. All Redi-Rock retaining wall products are manufactured and distributed through an international network of individually-owned, licensed precast concrete manufacturers.

DIMENSIONAL PROPERTIES

DIMENSIONS [1]	FULL BLOCK	HALF BLOCK
HEIGHT (FRONT OF BLOCK)	36 ± 3/16 (914 ± 5)	36 ± 3/16 (914 ± 5)
HEIGHT (BACK OF BLOCK)	36 ± 3/16 (914 ± 5)	36 ± 3/16 (914 ± 5)
LENGTH (FRONT OF BLOCK)	46 1/8 ± 1/2 (1172 ± 13)	23 1/16 ± 1/2 (586 ± 13)
LENGTH (BACK OF BLOCK)	28 1/8 ± 1/2 (714 ± 13)	14 1/16 ± 1/2 (356 ± 13)
WIDTH	66 5/8 ± 1/2 (1184 ± 13) FORM LINE TO BACK OF BLOCK AND 5 3/8 (136) ± FACE TEXTURE	
CONCRETE VOLUME	FULL BLOCK	HALF BLOCK
LEDGESTONE FACE	29.10 ft^3 (0.824 m^3)±	23.85 ft^3 (0.675 m^3)±
SHIPPING/HANDLING WEIGHT [2]	FULL BLOCK	HALF BLOCK
LEDGESTONE FACE	4160 lb (1890 kg)±	3410 lb (1550 kg)±

[1] All dimensions are *inches (mm)*.
[2] Weight shown is based on an assumed concrete unit weight of 143 lb/ft^3 (2291 kg/m^3). Actual weights will vary.

CONCRETE MIX PROPERTIES [3]

FREEZE THAW EXPOSURE CLASS [4]	MINIMUM 28 DAY COMPRESSIVE STRENGTH [5]	MAXIMUM WATER CEMENT RATIO	NOMINAL MAXIMUM AGGREGATE SIZE	AGGREGATE CLASS DESIGNATION [6]	AIR CONTENT [7]
MODERATE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3M	4.5% ± 1.5%
SEVERE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3S	6.0% ± 1.5%
VERY SEVERE	4,500 psi (30.0 MPa)	0.40	1 inch (25 mm)	4S	6.0% ± 1.5%
MAXIMUM WATER-SOLUBLE CHLORIDE ION (Cl^-) CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT [8,9]					0.15
MAXIMUM CHLORIDE AS Cl^- CONCENTRATION IN MIXING WATER, PARTS PER MILLION					1000
MAXIMUM PERCENTAGE OF TOTAL CEMENTITIOUS MATERIALS BY WEIGHT [10,12] (VERY SEVERE EXPOSURE CLASS ONLY)					
FLY ASH OR OTHER POZZOLANS CONFORMING TO ASTM C618					25
SLAG CONFORMING TO ASTM C989					50
SILICA FUME CONFORMING TO ASTM C1240					10
TOTAL OF FLY ASH OR OTHER POZZOLANS, SLAG, AND SILICA FUME [11]					50
TOTAL OF FLY ASH OR OTHER POZZOLANS AND SILICA FUME [11]					35
ALKALI-AGGREGATE REACTIVITY MITIGATION per ACI 201					

[3] Concrete mix properties are in general accordance with ACI 318 durability requirements. Research has shown that concrete manufactured to these standards demonstrates good durability and performance. When these requirements are followed, specific freeze-thaw testing of the concrete is typically NOT required.
[4] Exposure class is as described in ACI 318. "MODERATE" describes concrete that is exposed to freezing and thawing cycles and occasional exposure to moisture. "SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture. "VERY SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture and exposed to deicing chemicals. Exposure class should be specified by owner/purchaser prior to order placement. Longer lead times may be required for block units manufactured for "severe" and "very severe" exposure classes.
[5] Test method ASTM C39.
[6] Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete*.
[7] Test method ASTM C231.
[8] Test method ASTM C1218 at age between 28 and 42 days.
[9] Where used in high sulfate environments or where alkali-silica reactivity is an issue, water soluble chloride shall be limited to no more than trace amounts (from impurities in concrete-making components, not intended constituents.)
[10] The total cementitious material also includes ASTM C150, C595, C845, and C1157 cement. The maximum percentages shall include:
(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.
(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.
(c) Silica fume, ASTM C1240, present in a blended cement.
[11] Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.
[12] Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze/thaw durability in a detailed and current testing program.

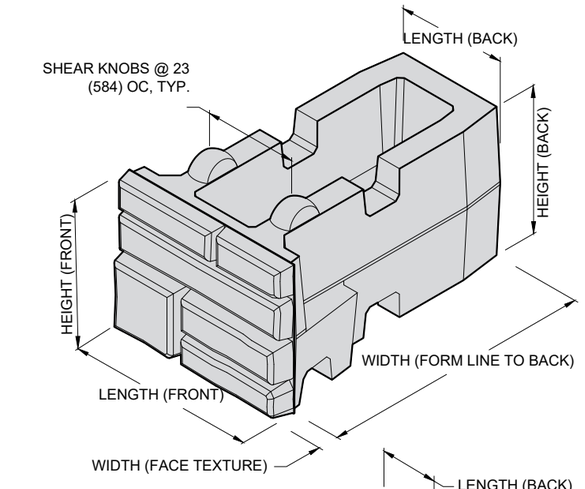
R-7236HC 72" (1,830 mm) Hollow-Core Retaining Blocks

DESIGN PROPERTIES

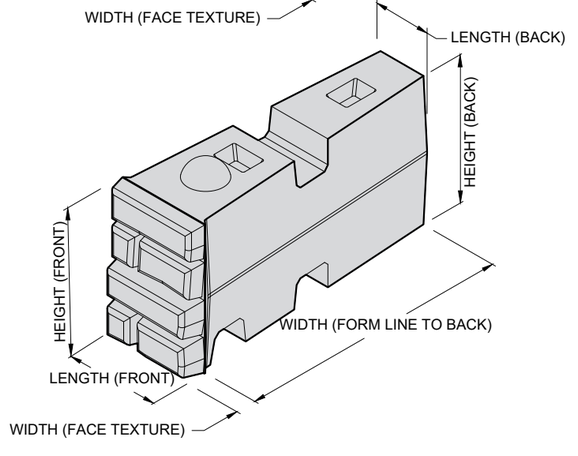
HORIZONTAL SETBACK / WALL FACE BATTER	BLOCK TO BLOCK INTERFACE SHEAR [13]	
	$S_{p(1)}$ = 4547 lb/ft + N tan 44° (66.4 kN/m + N tan 44°)	for N < 7017 lb/ft (N < 102.4 kN/m)
3 1/4 inches (83 mm) PER COURSE	$S_{p(2)}$ = 8488 lb/ft + N tan 22° (123.9 kN/m + N tan 22°)	for 7017 ≤ N < 16,118 lb/ft (102.4 ≤ N < 235.2 kN/m)
(5.2° BATTER)	$S_{p(max)}$ = 15,000 lb/ft (218.9 kN/m)	for N ≥ 16,118 lb/ft (N ≥ 235.2 kN/m)
INFILLED UNIT WEIGHT FOR WALL STABILITY CALCULATIONS [14]		
LEDGESTONE FACE	112 lb/ft^3 (1801 kN/m^3)	
MINIMUM CONSTRUCTION RADIUS [15]		
CONCAVE CURVE	14 ft - 6 in (4.42 m)	
CONVEX CURVE	14 ft - 6 in (4.42 m)	

[13] Values based on full scale testing performed in 2017 and 2018. Copies of the full test reports are available at www.redi-rock.com.
[14] The infilled unit weights shown here are based on an assumed concrete unit weight of 143 lb/ft^3 (2291 kg/m^3) and an assumed soil unit weight of 100 lb/ft^3 (1602 kN/m^3). They are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis.
[15] The minimum construction radius stated is applicable to both concave and convex curved retaining wall sections. Increases to this minimum radius are required to account for wall batter. Special consideration should be given to block selection, facing batter, and wall height when selecting the minimum radius for the final wall alignment.

FULL BLOCK



HALF BLOCK



R-9636HC 96" (2,440 mm) Hollow-Core Retaining Blocks

The Redi-Rock 96” (2,440 mm) XL retaining wall blocks are machine-placed, wet-cast, precast modular block units manufactured from first-purpose, non-reconstituted concrete and intended for use in the construction of dry-stacked modular retaining wall systems. The block units are manufactured from structural-grade concrete mixes in accordance with ASTM C94 or ASTM C685 that produce a finished unit with excellent resistance to freeze-thaw, deicing chemical exposure, and submerged conditions in both fresh water and salt water applications. All Redi-Rock retaining wall products are manufactured and distributed through an international network of individually-owned, licensed precast concrete manufacturers.

DIMENSIONAL PROPERTIES

DIMENSIONS [1]	FULL BLOCK	HALF BLOCK
HEIGHT (FRONT OF BLOCK)	36 ± 3⁄16 (914 ± 5)	36 ± 3⁄16 (914 ± 5)
HEIGHT (BACK OF BLOCK)	36 ± 3⁄16 (914 ± 5)	36 ± 3⁄16 (914 ± 5)
LENGTH (FRONT OF BLOCK)	46 1⁄8 ± ½ (1172 ± 13)	23 1⁄16 ± ½ (586 ± 13)
LENGTH (BACK OF BLOCK)	21 5⁄8 ± ½ (549 ± 13)	10 7⁄8 ± ½ (276 ± 13)
WIDTH	90 5⁄8 ± ½ (2302 ± 13) FORM LINE TO BACK OF BLOCK AND 5 3⁄8 (136) ± FACE TEXTURE	
CONCRETE VOLUME	FULL BLOCK	HALF BLOCK
LEDGESTONE FACE	33.83 ft^3 (0.958 m^3)±	28.31 ft^3 (0.604 m^3)±
SHIPPING/HANDLING WEIGHT [2]	FULL BLOCK	HALF BLOCK
LEDGESTONE FACE	4840 lb (2190 kg)±	4050 lb (1837 kg)±

[1] All dimensions are *inches (mm)*.
[2] Weight shown is based on an assumed concrete unit weight of 143 lb/ft^3 (2291 kg/m^3). Actual weights will vary.

CONCRETE MIX PROPERTIES [3]

FREEZE THAW EXPOSURE CLASS [4]	MINIMUM 28 DAY COMPRESSIVE STRENGTH [5]	MAXIMUM WATER CEMENT RATIO	NOMINAL MAXIMUM AGGREGATE SIZE	AGGREGATE CLASS DESIGNATION [6]	AIR CONTENT [7]
MODERATE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3M	4.5% ± 1.5%
SEVERE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3S	6.0% ± 1.5%
VERY SEVERE	4,500 psi (30.0 MPa)	0.40	1 inch (25 mm)	4S	6.0% ± 1.5%
MAXIMUM WATER-SOLUBLE CHLORIDE ION (Cl^-) CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT [8,9]					0.15
MAXIMUM CHLORIDE AS Cl^- CONCENTRATION IN MIXING WATER, PARTS PER MILLION					1000
MAXIMUM PERCENTAGE OF TOTAL CEMENTITIOUS MATERIALS BY WEIGHT [10,12] (VERY SEVERE EXPOSURE CLASS ONLY)					
FLY ASH OR OTHER POZZOLANS CONFORMING TO ASTM C618					25
SLAG CONFORMING TO ASTM C989					50
SILICA FUME CONFORMING TO ASTM C1240					10
TOTAL OF FLY ASH OR OTHER POZZOLANS, SLAG, AND SILICA FUME [11]					50
TOTAL OF FLY ASH OR OTHER POZZOLANS AND SILICA FUME [11]					35
ALKALI-AGGREGATE REACTIVITY MITIGATION per ACI 201					

[3] Concrete mix properties are in general accordance with ACI 318 durability requirements. Research has shown that concrete manufactured to these standards demonstrates good durability and performance. When these requirements are followed, specific freeze-thaw testing of the concrete is typically NOT required.
[4] Exposure class is as described in ACI 318. “MODERATE” describes concrete that is exposed to freezing and thawing cycles and occasional exposure to moisture. “SEVERE” describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture. “VERY SEVERE” describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture and exposed to deicing chemicals. Exposure class should be specified by owner/purchaser prior to order placement. Longer lead times may be required for block units manufactured for “severe” and “very severe” exposure classes.
[5] Test method ASTM C39.
[6] Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete.*
[7] Test method ASTM C231.
[8] Test method ASTM C1218 at age between 28 and 42 days.
[9] Where used in high sulfate environments or where alkali-silica reactivity is an issue, water soluble chloride shall be limited to no more than trace amounts (from impurities in concrete-making components, not intended constituents.)
[10] The total cementitious material also includes ASTM C150, C595, C845, and C1157 cement. The maximum percentages shall include:
(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.
(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.
(c) Silica fume, ASTM C1240, present in a blended cement.
[11] Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.
[12] Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze/thaw durability in a detailed and current testing program.

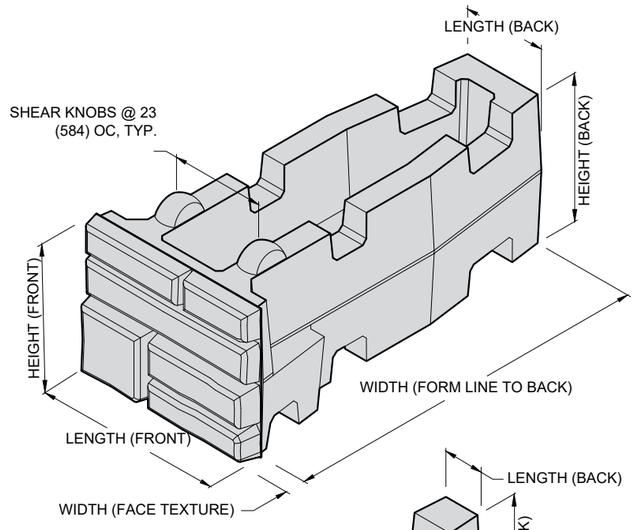
R-9636HC 96" (2,440 mm) Hollow-Core Retaining Blocks

DESIGN PROPERTIES

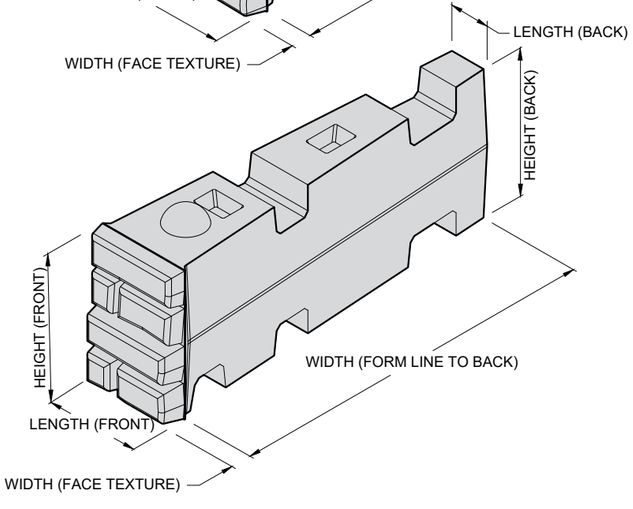
HORIZONTAL SETBACK / WALL FACE BATTER	BLOCK TO BLOCK INTERFACE SHEAR [13]	
	$S_{p(1)}$ = 4547 lb/ft + N tan 44° (66.4 kN/m + N tan 44°)	for N < 7017 lb/ft (N < 102.4 kN/m)
3¼ inches (83 mm) PER COURSE	$S_{p(2)}$ = 8488 lb/ft + N tan 22° (123.9 kN/m + N tan 22°)	for 7017 ≤ N < 16,118 lb/ft (102.4 ≤ N < 235.2 kN/m)
(5.2° BATTER)	$S_{p(max)}$ = 15,000 lb/ft (218.9 kN/m)	for N ≥ 16,118 lb/ft (N ≥ 235.2 kN/m)
INFILLED UNIT WEIGHT FOR WALL STABILITY CALCULATIONS [14]		
LEDGESTONE FACE	112 lb/ft^3 (1801 kN/m^3)	
MINIMUM CONSTRUCTION RADIUS [15]		
CONCAVE CURVE	14 ft - 6 in (4.42 m)	
CONVEX CURVE	14 ft - 6 in (4.42 m)	

[13] Values based on full scale testing performed in 2017 and 2018. Copies of the full test reports are available at www.redi-rock.com.
[14] The infilled unit weights shown here are based on an assumed concrete unit weight of 143 lb/ft^3 (2291 kg/m^3) and an assumed soil unit weight of 100 lb/ft^3 (1602 kN/m^3). They are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis.
[15] The minimum construction radius stated is applicable to both concave and convex curved retaining wall sections. Increases to this minimum radius are required to account for wall batter. Special consideration should be given to block selection, facing batter, and wall height when selecting the minimum radius for the final wall alignment.

FULL BLOCK



HALF BLOCK



Redi-Rock 41" (1030 mm) wide, 9" (230 mm) Setback Retaining Blocks

The Redi-Rock 9" (230mm) Setback Retaining wall blocks are machine-placed, wet-cast, precast modular block units manufactured from first-purpose, non-reconstituted concrete and intended for use in the construction of dry-stacked modular retaining wall systems. The block units are manufactured from structural-grade concrete mixes in accordance with ASTM C94 or ASTM C685 that produce a finished unit with excellent resistance to freeze-thaw, deicing chemical exposure, and submerged conditions in both fresh water and salt water applications. All Redi-Rock Retaining wall products are manufactured and distributed through an international network of individually-owned, licensed precast concrete manufacturers.

DIMENSIONAL PROPERTIES

DIMENSIONS [1]	MIDDLE	BOTTOM	HALF MIDDLE	HALF BOTTOM
HEIGHT (FRONT OF BLOCK)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)
HEIGHT (BACK OF BLOCK)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)
LENGTH (FRONT OF BLOCK)	46 1/8 ± 1/2 (1172 ± 13)		22 13/16 ± 1/4 (579 ± 6)	
LENGTH (BACK OF BLOCK)	36 5/8 ± 1/2 (930 ± 13)		13 9/16 ± 1/4 (344 ± 6)	
WIDTH	35 1/8 ± 1/2 (892 ± 13) FORM LINE TO BACK OF BLOCK AND ± 5 3/8 (136) FACE TEXTURE			
CONCRETE VOLUME	MIDDLE	BOTTOM	HALF MIDDLE	HALF BOTTOM
LIMESTONE/COBBLESTONE FACE	±16.21 ft^3 (0.459 m^3)	±17.13 ft^3 (0.48 m^3)	±7.20 ft^3 (0.20 m^3)	±7.63 ft^3 (0.22 m^3)
LEDGESTONE FACE	±15.72 ft^3 (0.445 m^3)	±16.63 ft^3 (0.47 m^3)	±6.96 ft^3 (0.20 m^3)	±7.39 ft^3 (0.21 m^3)
SHIPPING/HANDLING WEIGHT [2]	MIDDLE	BOTTOM	HALF MIDDLE	HALF BOTTOM
LIMESTONE/COBBLESTONE FACE	± 2319 lb (1051 kg)	± 2449 lb (1111 kg)	± 1030 lb (467 kg)	±1092 lb (495 kg)
LEDGESTONE FACE	± 2247 lb (1019 kg)	± 2378 lb (1078 kg)	± 995 lb (451 kg)	± 1057 lb (479 kg)

[1] All dimensions are *inches (mm)*.
[2] Weight shown is based on an assumed concrete unit weight of 143 lb/ft^3 (2291kg/m^3). Actual weights will vary.

CONCRETE MIX PROPERTIES [3]

FREEZE THAW EXPOSURE CLASS [4]	MINIMUM 28 DAY COMPRESSIVE STRENGTH [5]	MAXIMUM WATER CEMENT RATIO	NOMINAL MAXIMUM AGGREGATE SIZE	AGGREGATE CLASS DESIGNATION [6]	AIR CONTENT [7]
MODERATE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3M	4.5% ± 1.5%
SEVERE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3S	6.0% ± 1.5%
VERY SEVERE	4,500 psi (30.0 MPa)	0.40	1 inch (25 mm)	4S	6.0% ± 1.5%
MAXIMUM WATER-SOLUBLE CHLORIDE ION (Cl^-) CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT [8,9]					0.15
MAXIMUM CHLORIDE AS Cl^- CONCENTRATION IN MIXING WATER, PARTS PER MILLION					1000
MAXIMUM PERCENTAGE OF TOTAL CEMENTITIOUS MATERIALS BY WEIGHT [10,12] (VERY SEVERE EXPOSURE CLASS ONLY)					
FLY ASH OR OTHER POZZOLANS CONFORMING TO ASTM C618					25
SLAG CONFORMING TO ASTM C989					50
SILICA FUME CONFORMING TO ASTM C1240					10
TOTAL OF FLY ASH OR OTHER POZZOLANS, SLAG, AND SILICA FUME [11]					50
TOTAL OF FLY ASH OR OTHER POZZOLANS AND SILICA FUME [11]					35
ALKALI-AGGREGATE REACTIVITY MITIGATION PER ACI 201					

[3] Concrete mix properties are in general accordance with ACI 318 durability requirements. Research has shown that concrete manufactured to these standards demonstrates good durability and performance. When these requirements are followed, specific freeze-thaw testing of the concrete is typically NOT required.
[4] Exposure class is as described in ACI 318. "MODERATE" describes concrete that is exposed to freezing and thawing cycles and occasional exposure to moisture. "SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture. "VERY SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture and exposed to deicing chemicals. Exposure class should be specified by owner/purchaser prior to order placement. Longer lead times may be required for block units manufactured for "severe" and "very severe" exposure classes.
[5] Test method ASTM C39.
[6] Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete.*
[7] Test method ASTM C231.
[8] Test method ASTM C1218 at age between 28 and 42 days.
[9] Where used in high sulfate environments or where alkali-silica reactivity is an issue, water soluble chloride shall be limited to no more than trace amounts (from impurities in concrete-making components, not intended constituents.)
[10] The total cementitious material also includes ASTM C150, C595, C845, and C1157 cement. The maximum percentages shall include:
(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.
(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.
(c) Silica fume, ASTM C1240, present in a blended cement.
[11] Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.
[12] Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze/thaw durability in a detailed and current testing program.

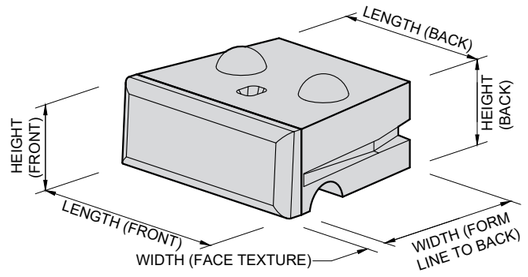
Redi-Rock 41" (1030 mm) wide, 9" (230 mm) Setback Retaining Blocks

DESIGN PROPERTIES

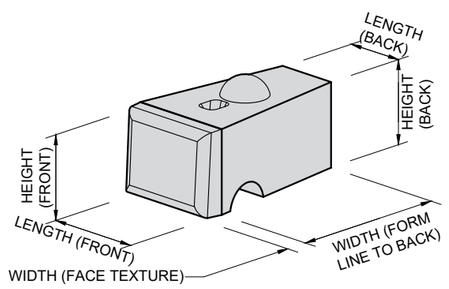
HORIZONTAL SETBACK / WALL FACE BATTER OPTIONS		BLOCK TO BLOCK INTERFACE SHEAR [13]
10 inch (254 mm) KNOB	1 5/8 inch (41 mm) PER BLOCK COURSE (5.2° BATTER)	V = 6,061 + N tan 44° ≤ 11,276 lb/ft (88.4 + N tan 44° ≤ 164.5 kN/m)
7 1/2 inch (190 mm) KNOB	3/8 inch (10 mm) PER BLOCK COURSE (1.2° BATTER)	V = 1,178 + N tan 54° ≤ 10,970 lb/ft (17.2 + N tan 54° ≤ 160.1 kN/m)
6 3/4 inch (171 mm) KNOB	NO SETBACK (NO BATTER) [12]	V = 1,178 + N tan 54° ≤ 10,970 lb/ft (17.2 + N tan 54° ≤ 160.1 kN/m)

LIMESTONE / COBBLESTONE BLOCKS	128 lb/ft^3 (2082 kN/m^3)
LEDGESTONE BLOCKS	125 lb/ft^3 (2018 kN/m^3)
MINIMUM CONSTRUCTION RADIUS [15]	
CONCAVE CURVE	14 ft 6 in (4.42 m)
CONVEX CURVE	14 ft 6 in (4.42 m)

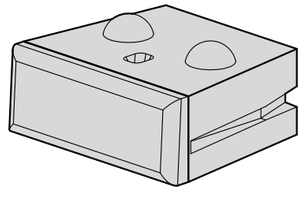
[12] Special consideration should be given to the design of vertical retaining walls subject to active lateral earth pressure.
[13] Values based on full scale testing performed in October 2011. Copies of the full test reports are available at www.redi-rock.com.
[14] The infilled unit weights shown here are based on an assumed concrete unit weight of 143 lb/ft^3 (2291 kg/m^3) and an assumed soil unit weight of 100 lb/ft^3 (1602 kg/m^3). They are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis.
[15] The minimum construction radius stated is applicable to both concave and convex curved retaining wall sections. Increases to this minimum radius are required to account for wall batter. Special consideration should be given to block selection, facing batter, and wall height when selecting the minimum radius for the final wall alignment.



MIDDLE



HALF MIDDLE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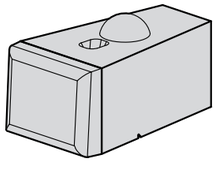
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redi-rock.com

Redi-Rock 60" (1520 mm) wide, 9" (230) mm Setback Retaining Blocks

The Redi-Rock 60" (1520mm) Retaining wall blocks are machine-placed, wet-cast, precast modular block units manufactured from first-purpose, non-reconstituted concrete and intended for constructing dry-stacked modular retaining wall systems. The block units are manufactured from structural-grade concrete mixes in accordance with ASTM C94 or ASTM C685 that produce a finished unit with excellent resistance to freeze-thaw, deicing chemical exposure, and submerged conditions in both fresh water and salt water applications. All Redi-Rock Retaining wall products are manufactured and distributed through an international network of individually-owned, licensed precast concrete manufacturers.

DIMENSIONAL PROPERTIES

DIMENSIONS [1]	MIDDLE	BOTTOM	HALF MIDDLE	HALF BOTTOM
HEIGHT (FRONT OF BLOCK)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)
HEIGHT (BACK OF BLOCK)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)
LENGTH (FRONT OF BLOCK)	46 1/8 ± 1/2 (1172 ± 13)		22 13/16 ± 1/4 (579 ± 6)	
LENGTH (BACK OF BLOCK)	31 3/8 ± 1/2 (797 ± 13)		8 3/8 ± 1/4 (231 ± 6)	
WIDTH	54 5/8 ± 1/2 (1387 ± 13) PLUS ± 5 3/8 (136) FACE TEXTURE		54 5/8 ± 1/2 (1387 ± 13) PLUS ± 5 3/8 (136) FACE TEXTURE	
CONCRETE VOLUME	MIDDLE	BOTTOM	HALF MIDDLE	HALF BOTTOM
LIMESTONE/COBBLESTONE FACE	± 23.06 ft^3 (0.653 m^3)	± 23.97 ft^3 (0.677 m^3)	± 9.37 ft^3 (0.264 m^3)	± 9.80 ft^3 (0.276 m^3)
LEDGESTONE FACE	± 22.56 ft^3 (0.639 m^3)	± 23.47 ft^3 (0.665 m^3)	± 9.12ft^3 (0.258 m^3)	± 9.55 ft^3 (0.270 m^3)
SHIPPING/HANDLING WEIGHT [2]	MIDDLE	BOTTOM	HALF MIDDLE	HALF BOTTOM
LIMESTONE/COBBLESTONE FACE	± 3297 lb (1495 kg)	± 3428 lb (1554 kg)	±1340 lb (608 kg)	± 1401 lb (635 kg)
LEDGESTONE FACE	± 3226 lb (1463 kg)	± 3356 lb (1522 kg)	± 1305 lb (592 kg)	± 1366 lb (620 kg)

[1] All dimensions are *inches (mm)*.
[2] Weight shown is based on an assumed concrete unit weight of 143 lb/ft^3 (2291 kg/m^3). Actual weights will vary.

CONCRETE MIX PROPERTIES [3]

FREEZE THAW EXPOSURE CLASS [4]	MINIMUM 28 DAY COMPRESSIVE STRENGTH [5]	MAXIMUM WATER CEMENT RATIO	NOMINAL MAXIMUM AGGREGATE SIZE	AGGREGATE CLASS DESIGNATION [6]	AIR CONTENT [7]
MODERATE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3M	4.5% ± 1.5%
SEVERE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3S	6.0% ± 1.5%
VERY SEVERE	4,500 psi (30.0 MPa)	0.40	1 inch (25 mm)	4S	6.0% ± 1.5%
MAXIMUM WATER-SOLUBLE CHLORIDE ION (Cl^-) CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT [8,9]					0.15
MAXIMUM CHLORIDE AS Cl^- CONCENTRATION IN MIXING WATER, PARTS PER MILLION					1000
MAXIMUM PERCENTAGE OF TOTAL CEMENTITIOUS MATERIALS BY WEIGHT [10,12] (VERY SEVERE EXPOSURE CLASS ONLY)					
FLY ASH OR OTHER POZZOLANS CONFORMING TO ASTM C618					25
SLAG CONFORMING TO ASTM C989					50
SILICA FUME CONFORMING TO ASTM C1240					10
TOTAL OF FLY ASH OR OTHER POZZOLANS, SLAG, AND SILICA FUME [11]					50
TOTAL OF FLY ASH OR OTHER POZZOLANS AND SILICA FUME [11]					35
ALKALI-AGGREGATE REACTIVITY MITIGATION PER ACI 201					

[3] Concrete mix properties are in general accordance with ACI 318 durability requirements. Research has shown that concrete manufactured to these standards demonstrates good durability and performance. When these requirements are followed, specific freeze-thaw testing of the concrete is typically NOT required.
[4] Exposure class is as described in ACI 318. "MODERATE" describes concrete that is exposed to freezing and thawing cycles and occasional exposure to moisture. "SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture. "VERY SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture and exposed to deicing chemicals. Exposure class should be specified by owner/purchaser prior to order placement. Longer lead times may be required for block units manufactured for "severe" and "very severe" exposure classes.
[5] Test method ASTM C39.
[6] Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete.*
[7] Test method ASTM C231.
[8] Test method ASTM C1218 at age between 28 and 42 days.
[9] Where used in high sulfate environments or where alkali-silica reactivity is an issue, water soluble chloride shall be limited to no more than trace amounts (from impurities in concrete-making components, not intended constituents.)
[10] The total cementitious material also includes ASTM C150, C595, C845, and C1157 cement. The maximum percentages shall include:
(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.
(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.
(c) Silica fume, ASTM C1240, present in a blended cement.
[11] Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.
[12] Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze/thaw durability in a detailed and current testing program.

Redi-Rock 60" (1520 mm) wide, 9" (230 mm) Setback Retaining Blocks

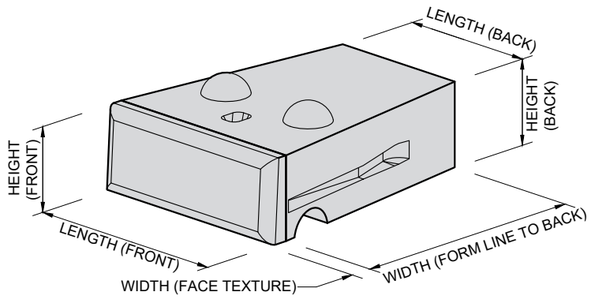
DESIGN PROPERTIES

HORIZONTAL SETBACK / WALL FACE BATTER OPTIONS		BLOCK TO BLOCK INTERFACE SHEAR [13]
10 inch (254 mm) KNOB	1 5/8 inch (41 mm) PER BLOCK COURSE (5.2° BATTER)	V = 6,061 + N tan 44° ≤ 11,276 lb/ft (88.4 + N tan 44° ≤ 164.5 kN/m)
7 1/2 inch (190 mm) KNOB	3/8 inch (10 mm) PER BLOCK COURSE (1.2° BATTER)	V = 1,178 + N tan 54° ≤ 10,970 lb/ft (17.2 + N tan 54° ≤ 160.1 kN/m)
6 3/4 inch (171 mm) KNOB	NO SETBACK (NO BATTER) [12]	V = 1,178 + N tan 54° ≤ 10,970 lb/ft (17.2 + N tan 54° ≤ 160.1 kN/m)

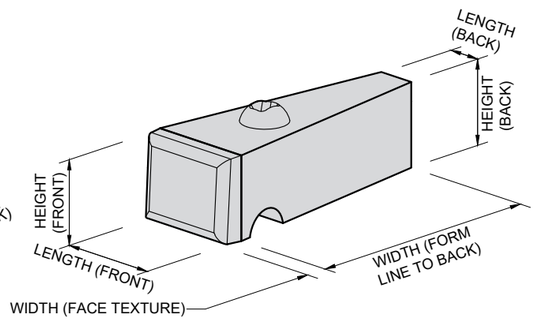
INFILLED UNIT WEIGHT FOR WALL STABILITY CALCULATIONS [14]	60" (1520) BOTTOM RETAINING UNIT	60" (1520) MIDDLE RETAINING UNIT
LIMESTONE / COBBLESTONE BLOCKS	135 lb/ft^3 (2146 kg/m^3)	131 lb/ft^3 (2082 kg/m^3)
LEDGESTONE BLOCKS	132 lb/ft^3 (2114 kg/m^3)	128 lb/ft^3 (2050 kg/m^3)

MINIMUM CONSTRUCTION RADIUS [15]	
CONCAVE CURVE	14 ft 6 in (4.42 m)
CONVEX CURVE	14 ft 6 in (4.42 m)

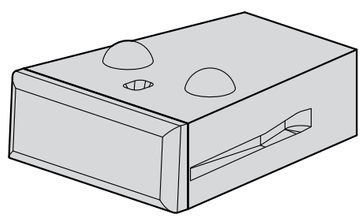
[12] Special consideration should be given to the design of vertical retaining walls subject to active lateral earth pressure.
[13] Values based on full scale testing performed in October 2011. Copies of the full test reports are available at www.redi-rock.com.
[14] The infilled unit weights shown here are based on full width units and an assumed concrete unit weight of 143 lb/ft^3 (2291 kg/m^3) and an assumed soil unit weight of 100 lb/ft^3 (1602 kg/m^3). They are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis.
[15] The minimum construction radius stated is applicable to both concave and convex curved retaining wall sections. Increases to this minimum radius are required to account for wall batter. Special consideration should be given to block selection, facing batter, and wall height when selecting the minimum radius for the final wall alignment.



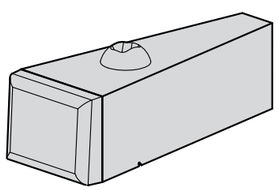
MIDDLE - 60" (1520)



HALF MIDDLE - 60" (1520)



BOTTOM - 60" (1520)



HALF BOTTOM - 60" (1520)

Revised 110518

Redi-Rock 28" (710 mm) & 41" (1030 mm) Positive Connection (PC) Retaining Blocks

The Redi-Rock 28" (710mm) & 41" (1030mm) Positive Connection retaining wall blocks are machine-placed, wet-cast, precast modular block units manufactured from first-purpose, non-reconstituted concrete and intended for constructing dry-stacked modular retaining wall systems. The block units are manufactured from structural-grade concrete mixes in accordance with ASTM C94 or ASTM C685 that produce a finished unit with excellent resistance to freeze-thaw, deicing chemical exposure, and submerged conditions in both fresh water and salt water applications. All Redi-Rock Retaining wall products are manufactured and distributed through an international network of individually-owned, licensed precast concrete manufacturers.

DIMENSIONAL PROPERTIES

DIMENSIONS [1]	TOP - 28" (710)	MIDDLE - 28" (710)	BOTTOM - 28" (710)	TOP - 41" (1030)	MIDDLE - 41" (1030)	BOTTOM - 41" (1030)
HEIGHT (FRONT OF BLOCK)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)
HEIGHT (BACK OF BLOCK)	13 ± 3/16 (330 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)	13 ± 3/16 (330 ± 5)	18 ± 3/16 (457 ± 5)	18 ± 3/16 (457 ± 5)
LENGTH (FRONT OF BLOCK)	46 1/8 ± 1/2 (1172 ± 13)			46 1/8 ± 1/2 (1172 ± 13)		
LENGTH (BACK OF BLOCK)	40 ± 1/2 (1016 ± 13)			36 5/8" ± 1/2 (930 ± 13)		
WIDTH	22 5/8 ± 1/2 (575 ± 13) PLUS ± 5 3/8 (136) FACE TEXTURE			35 1/8 ± 1/2 (892 ± 13) PLUS ± 5 3/8 (136) FACE TEXTURE		
CONCRETE VOLUME	TOP - 28" (710)	MIDDLE - 28" (710)	BOTTOM - 28" (710)	TOP - 41" (1030)	MIDDLE - 41" (1030)	BOTTOM - 41" (1030)
LIMESTONE/COBBLESTONE FACE	±8.16 ft³ (0.231 m³)	±10.62 ft³ (0.301 m³)	±11.34 ft³ (0.321 m³)	±11.38 ft³ (0.322 m³)	±15.19 ft³ (0.430 m³)	±15.92 ft³ (0.451 m³)
LEDGESTONE FACE	±7.67 ft³ (0.217 m³)	±10.12 ft³ (0.287 m³)	±10.85 ft³ (0.307 m³)	±10.88 ft³ (0.308 m³)	±14.69 ft³ (0.416 m³)	±15.42 ft³ (0.437 m³)
SHIPPING/HANDLING WEIGHT [2]	TOP - 28" (710)	MIDDLE - 28" (710)	BOTTOM - 28" (710)	TOP - 41" (1030)	MIDDLE - 41" (1030)	BOTTOM - 41" (1030)
LIMESTONE/COBBLESTONE FACE	± 1167 lb (529 kg)	± 1518 lb (689 kg)	± 1622 lb (736 kg)	± 1627 lb (738 kg)	±2172 lb (985 kg)	± 2276 lb (1032 kg)
LEDGESTONE FACE	± 1096 lb (497 kg)	± 1447 lb (656 kg)	± 1551 lb (703 kg)	± 1556 lb (706 kg)	± 2101 lb (953 kg)	± 2205 lb (1000 kg)

[1] All dimensions are *inches (mm)*.
[2] Weight shown is based on an assumed concrete unit weight of 143 lb/ft³ (2291 kg/m³). Actual weights will vary.

CONCRETE MIX PROPERTIES [3]

FREEZE THAW EXPOSURE CLASS [4]	MINIMUM 28 DAY COMPRESSIVE STRENGTH [5]	MAXIMUM WATER CEMENT RATIO	NOMINAL MAXIMUM AGGREGATE SIZE	AGGREGATE CLASS DESIGNATION [6]	AIR CONTENT [7]
MODERATE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3M	4.5% ± 1.5%
SEVERE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3S	6.0% ± 1.5%
VERY SEVERE	4,500 psi (30.0 MPa)	0.40	1 inch (25 mm)	4S	6.0% ± 1.5%
MAXIMUM WATER-SOLUBLE CHLORIDE ION (Cl^-) CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT [8,9]					0.15
MAXIMUM CHLORIDE AS Cl^- CONCENTRATION IN MIXING WATER, PARTS PER MILLION					1000
MAXIMUM PERCENTAGE OF TOTAL CEMENTITIOUS MATERIALS BY WEIGHT [10,12] (VERY SEVERE EXPOSURE CLASS ONLY)					
FLY ASH OR OTHER POZZOLANS CONFORMING TO ASTM C618					25
SLAG CONFORMING TO ASTM C989					50
SILICA FUME CONFORMING TO ASTM C1240					10
TOTAL OF FLY ASH OR OTHER POZZOLANS, SLAG, AND SILICA FUME [11]					50
TOTAL OF FLY ASH OR OTHER POZZOLANS AND SILICA FUME [11]					35
ALKALI-AGGREGATE REACTIVITY MITIGATION PER ACI 201					

[3] Concrete mix properties are in general accordance with ACI 318 durability requirements. Research has shown that concrete manufactured to these standards demonstrates good durability and performance. When these requirements are followed, specific freeze-thaw testing of the concrete is typically NOT required.
[4] Exposure class is as described in ACI 318. "MODERATE" describes concrete that is exposed to freezing and thawing cycles and occasional exposure to moisture. "SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture. "VERY SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture and exposed to deicing chemicals. Exposure class should be specified by owner/purchaser prior to order placement. Longer lead times may be required for block units manufactured for "severe" and "very severe" exposure classes.
[5] Test method ASTM C39.
[6] Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete.*
[7] Test method ASTM C231.
[8] Test method ASTM C1218 at age between 28 and 42 days.
[9] Where used in high sulfate environments or where alkali-silica reactivity is an issue, water soluble chloride shall be limited to no more than trace amounts (from impurities in concrete-making components, not intended constituents.)
[10] The total cementitious material also includes ASTM C150, C595, C845, and C1157 cement. The maximum percentages shall include:
(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.
(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.
(c) Silica fume, ASTM C1240, present in a blended cement.
[11] Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.
[12] Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze/thaw durability in a detailed and current testing program.

Redi-Rock 28" (710 mm) & 41" (1030 mm) Positive Connection (PC) Retaining Blocks

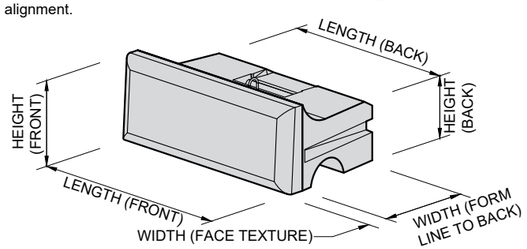
DESIGN PROPERTIES

HORIZONTAL SETBACK / WALL FACE BATTER OPTIONS		BLOCK TO BLOCK INTERFACE SHEAR [13]
10 inch (254 mm) KNOB	1 5/8 inch (41 mm) PER BLOCK COURSE (5.2° BATTER)	V = 6,061 + N tan 44° ≤ 11,276 lb/ft (88.4 + N tan 44° ≤ 164.5 kN/m)
7 1/2 inch (190 mm) KNOB	3/8 inch (10 mm) PER BLOCK COURSE (1.2° BATTER)	V = 1,178 + N tan 54° ≤ 10,970 lb/ft (17.2 + N tan 54° ≤ 160.1 kN/m)
6 3/4 inch (171 mm) KNOB	NO SETBACK (NO BATTER) [12]	V = 1,178 + N tan 54° ≤ 10,970 lb/ft (17.2 + N tan 54° ≤ 160.1 kN/m)

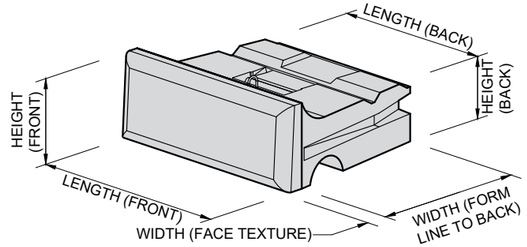
INFILLED UNIT WEIGHT FOR WALL STABILITY CALCULATIONS [14]	28" (710) POSITIVE CONNECTION UNIT	41" (1030) POSITIVE CONNECTION UNIT
LIMESTONE / COBBLESTONE BLOCKS	125 lb/ft³ (2000 kg/m³)	126 lb/ft³ (2018 kg/m³)
LEDGESTONE BLOCKS	120 lb/ft³ (1921 kg/m³)	123 lb/ft³ (1970 kg/m³)

MINIMUM CONSTRUCTION RADIUS [15]	
CONCAVE CURVE	14 ft 6 in (4.42 m)
CONVEX CURVE	14 ft 6 in (4.42 m)

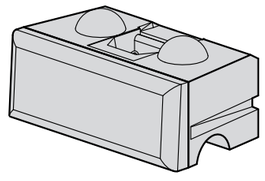
[12] Special consideration should be given to the design of vertical retaining walls subject to active lateral earth pressure.
[13] Values based on full scale testing performed in October 2011. Copies of the full test reports are available at www.redi-rock.com.
[14] The infilled unit weights shown here are based on an assumed concrete unit weight of 143 lb/ft³ (2291 kg/m³) and an assumed soil unit weight of 100 lb/ft³ (1602 kg/m³). They are reference values. Several factors can cause the unit weights of both concrete and infill soil to vary. The designer should use sound engineering judgement when assigning an infilled unit weight value for analysis.
[15] The minimum construction radius stated is applicable to both concave and convex curved retaining wall sections. Increases to this minimum radius are required to account for wall batter. Special consideration should be given to block selection, facing batter, and wall height when selecting the minimum radius for the final wall alignment.

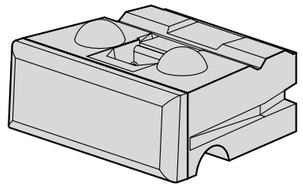


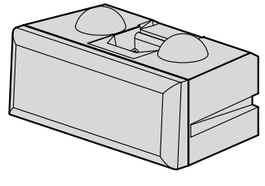
28" (710 mm) TOP

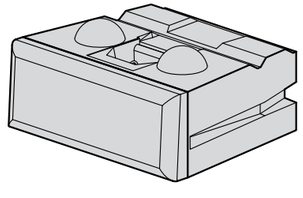


41" (1030 mm) TOP


28" (710 mm) MIDDLE


41" (1030 mm) MIDDLE


28" (710 mm) BOTTOM


41" (1030 mm) BOTTOM

Revised 110518

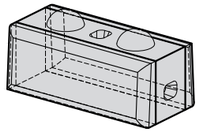
Redi-Rock Freestanding Straight Blocks

The Redi-Rock Freestanding wall units are machine-placed, wet-cast, precast modular block units manufactured from first-purpose, non-reconstituted concrete and intended to be used exclusively or in combination with dry-stacked modular retaining wall blocks. These units are manufactured from structural-grade concrete mixes in accordance with ASTM C94 or ASTM C685 that produce a finished unit with excellent resistance to freeze-thaw, deicing chemical exposure, and submerged conditions in both fresh water and salt water applications. All Redi-Rock products are manufactured and distributed through an international network of individually-owned, licensed precast concrete manufacturers.

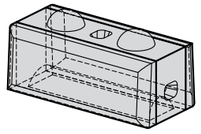
DIMENSIONAL PROPERTIES

DIMENSIONS [1]				
HEIGHT: 18 ± 3/16 (457 ± 5)	LENGTH: 46 1/8 ± 1/2 (1172 ± 13)	WIDTH: ± 24 (610) LEDGESTONE / COBBLESTONE, ± 23 (584) LIMESTONE		
CONCRETE VOLUME	BOTTOM	MIDDLE	TOP	GARDEN TOP
LIMESTONE/COBBLESTONE FACE	±10.65 ft³ (0.302 m³)	±9.84 ft³ (0.279 m³)	±9.61 ft³ (0.272 m³)	±7.35 ft³ (0.208 m³)
LEDGESTONE FACE	±9.66 ft³ (0.273 m³)	±8.84 ft³ (0.250 m³)	±8.62 ft³ (0.244 m³)	±6.35 ft³ (0.180 m³)
SHIPPING/HANDLING WEIGHT [2]	BOTTOM	MIDDLE	TOP	GARDEN TOP
LIMESTONE/COBBLESTONE FACE	± 1523 lb (691 kg)	± 1407 lb (638 kg)	± 1375 lb (623 kg)	± 1050 lb (476 kg)
LEDGESTONE FACE	± 1381 lb (626 kg)	± 1264 lb (573 kg)	± 1232 lb (559 kg)	± 908 lb (412 kg)

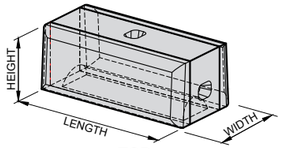
[1] All dimensions are *inches (mm)*.
[2] Weight shown is based on an assumed concrete unit weight of 143 lb/ft³ (2291 kg/m³). Actual weights will vary.



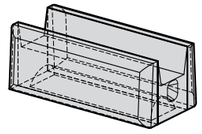
BOTTOM



MIDDLE



TOP



GARDEN TOP

CONCRETE MIX PROPERTIES [3]

FREEZE THAW EXPOSURE CLASS [4]	MINIMUM 28 DAY COMPRESSIVE STRENGTH [5]	MAXIMUM WATER CEMENT RATIO	NOMINAL MAXIMUM AGGREGATE SIZE	AGGREGATE CLASS DESIGNATION [6]	AIR CONTENT [7]
MODERATE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3M	4.5% ± 1.5%
SEVERE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3S	6.0% ± 1.5%
VERY SEVERE	4,500 psi (30.0 MPa)	0.40	1 inch (25 mm)	4S	6.0% ± 1.5%
MAXIMUM WATER-SOLUBLE CHLORIDE ION (Cl^-) CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT [8,9]					0.15
MAXIMUM CHLORIDE AS Cl^- CONCENTRATION IN MIXING WATER, PARTS PER MILLION					1000
MAXIMUM PERCENTAGE OF TOTAL CEMENTITIOUS MATERIALS BY WEIGHT [10,12] (VERY SEVERE EXPOSURE CLASS ONLY)					
FLY ASH OR OTHER POZZOLANS CONFORMING TO ASTM C618					25
SLAG CONFORMING TO ASTM C989					50
SILICA FUME CONFORMING TO ASTM C1240					10
TOTAL OF FLY ASH OR OTHER POZZOLANS, SLAG, AND SILICA FUME [11]					50
TOTAL OF FLY ASH OR OTHER POZZOLANS AND SILICA FUME [11]					35

[3] Concrete mix properties are in general accordance with ACI 318 durability requirements. Research has shown that concrete manufactured to these standards demonstrates good durability and performance. When these requirements are followed, specific freeze-thaw testing of the concrete is typically NOT required.
[4] Exposure class is as described in ACI 318. "MODERATE" describes concrete that is exposed to freezing and thawing cycles and occasional exposure to moisture. "SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture. "VERY SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture and exposed to deicing chemicals. Exposure class should be specified by owner/purchaser prior to order placement. Longer lead times may be required for block units manufactured for "severe" and "very severe" exposure classes.
[5] Test method ASTM C39.
[6] Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete.*
[7] Test method ASTM C231.
[8] Test method ASTM C1218 at age between 28 and 42 days.
[9] Where used in high sulfate environments or where alkali-silica reactivity is an issue, water soluble chloride shall be limited to no more than trace amounts (from impurities in concrete-making components, not intended constituents.)
[10] The total cementitious material also includes ASTM C150, C595, C845, and C1157 cement. The maximum percentages shall include:
(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.
(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.
(c) Silica fume, ASTM C1240, present in a blended cement.
[11] Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.
[12] Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze/thaw durability in a detailed and current testing program.

Revised 110518

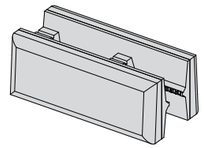
Redi-Rock Hollow-Core Freestanding Blocks

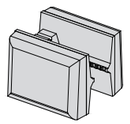
The Redi-Rock Hollow-Core Freestanding wall units are machine-placed, wet-cast, precast modular block units manufactured from first-purpose, non-reconstituted concrete and intended to be used exclusively or in combination with dry-stacked modular retaining wall blocks. These units are manufactured from structural-grade concrete mixes in accordance with ASTM C94 or ASTM C685 that produce a finished unit with excellent resistance to freeze-thaw, deicing chemical exposure, and submerged conditions in both fresh water and salt water applications. All Redi-Rock products are manufactured and distributed through an international network of individually-owned, licensed precast concrete manufacturers.

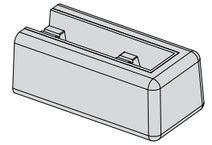
DIMENSIONAL PROPERTIES

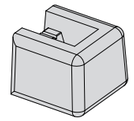
DIMENSIONS [1]				
HEIGHT: 18 ± 3/16 (457 ± 5)	LENGTH: 46 1/8 ± 1/2 (1172 ± 13)	WIDTH: 24 (610) ± LEDGESTONE / COBBLESTONE, 23 (584) ± LIMESTONE		
CONCRETE VOLUME	HOLLOW-CORE	HALF	CORNER	HALF CORNER
LIMESTONE/COBBLESTONE FACE	6.38 ft³ (0.181 m³) ±	3.19 ft³ (0.090 m³) ±	7.01 ft³ (0.198 m³) ±	3.81 ft³ (0.108 m³) ±
LEDGESTONE FACE	5.38 ft³ (0.152 m³) ±	2.69 ft³ (0.076 m³) ±	6.80 ft³ (0.192 m³) ±	3.53 ft³ (0.100 m³) ±
SHIPPING/HANDLING WEIGHT [2]	HOLLOW-CORE	HALF	CORNER	HALF CORNER
LIMESTONE/COBBLESTONE FACE	913 lb (414 kg) ±	456 lb (207 kg) ±	1002 lb (455 kg) ±	545 lb (247 kg) ±
LEDGESTONE FACE	770 lb (349 kg) ±	385 lb (175 kg) ±	972 lb (441 kg) ±	505 lb (229 kg) ±

[1] All dimensions are *inches (mm)*.
[2] Weight shown is based on an assumed concrete unit weight of 143 lb/ft³ (2291 kg/m³). Actual weights will vary.









CONCRETE MIX PROPERTIES [2]

FREEZE THAW EXPOSURE CLASS [4]	MINIMUM 28 DAY COMPRESSIVE STRENGTH [5]	MAXIMUM WATER CEMENT RATIO	NOMINAL MAXIMUM AGGREGATE SIZE	AGGREGATE CLASS DESIGNATION [6]	AIR CONTENT [7]
MODERATE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3M	4.5% ± 1.5%
SEVERE	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3S	6.0% ± 1.5%
VERY SEVERE	4,500 psi (30.0 MPa)	0.40	1 inch (25 mm)	4S	6.0% ± 1.5%
MAXIMUM WATER-SOLUBLE CHLORIDE ION (Cl^-) CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT [8,9]					0.15
MAXIMUM CHLORIDE AS Cl^- CONCENTRATION IN MIXING WATER, PARTS PER MILLION					1000
MAXIMUM PERCENTAGE OF TOTAL CEMENTITIOUS MATERIALS BY WEIGHT [10] (VERY SEVERE EXPOSURE CLASS ONLY)					
FLY ASH OR OTHER POZZOLANS CONFORMING TO ASTM C618					25
SLAG CONFORMING TO ASTM C989					50
SILICA FUME CONFORMING TO ASTM C1240					10
TOTAL OF FLY ASH OR OTHER POZZOLANS, SLAG, AND SILICA FUME [11]					50
TOTAL OF FLY ASH OR OTHER POZZOLANS AND SILICA FUME [11]					35

[3] Concrete mix properties are in general accordance with ACI 318 durability requirements. Research has shown that concrete manufactured to these standards demonstrates good durability and performance. When these requirements are followed, specific freeze-thaw testing of the concrete is typically NOT required.
[4] Exposure class is as described in ACI 318. "MODERATE" describes concrete that is exposed to freezing and thawing cycles and occasional exposure to moisture. "SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture. "VERY SEVERE" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture and exposed to deicing chemicals. Exposure class should be specified by owner/purchaser prior to order placement. Longer lead times may be required for block units manufactured for "severe" and "very severe" exposure classes.
[5] Test method ASTM C39.
[6] Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete.*
[7] Test method ASTM C231.
[8] Test method ASTM C1218 at age between 28 and 42 days.
[9] Where used in high sulfate environments or where alkali-silica reactivity is an issue, water soluble chloride shall be limited to no more than trace amounts (from impurities in concrete-making components, not intended constituents.)
[10] The total cementitious material also includes ASTM C150, C595, C845, and C1157 cement. The maximum percentages shall include:
(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.
(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.
(c) Silica fume, ASTM C1240, present in a blended cement.
[11] Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.

Revised 110218

CSI SPECIFICATIONS

Precast Modular Block Retaining Wall Specification

CSI Format

02/01/19

The following specification addresses PMB walls designed as unreinforced gravity structures or reinforced with geosynthetic reinforcement. This document is a guide specification and should be modified as necessary for your particular project. An editable version of this document is available for download at **redi-rock.com**.

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SECTION 32 32 16
PRECAST MODULAR BLOCK RETAINING WALL

PART 1 – GENERAL

1.01 SUMMARY

A. This Section includes furnishing all materials and labor required for the design and construction of a precast concrete modular block (PMB) retaining wall with or without geosynthetic reinforcement. Precast modular block retaining wall blocks under this section shall be cast utilizing a wet-cast concrete mix and exhibit a final handling weight in excess of 1,000 pounds (450 kg) per unit.

B. Scope of Work: The work shall consist of furnishing materials, labor, equipment and supervision for the construction of a precast modular block (PMB) retaining wall structure in accordance with the requirements of this section and in acceptable conformity with the lines, grades, design and dimensions shown in the project site plans.

C. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 31, Division 32 and Division 33 also apply to this Section.

1.02 PRICE AND PAYMENT PROCEDURES

A. Allowances. No allowance shall be made in the price of the retaining wall for excavation beyond the limits required for retaining wall construction as shown on the project plans. The cost of excavation for the purposes of site access shall be the responsibility of the General Contractor. Removal of unsuitable soils and replacement with select fill shall be as directed and approved in writing by the Owner or Owner's representative and shall be paid under separate pay items.

B. Unit Prices. In addition to a lump sum price pursuant to completion of the scope of work described in Part 1.01 of this Section, the General Contractor shall provide a unit price per square foot of vertical wall face that shall be the basis of compensation for up to a ten (10) percent increase or reduction in the overall scope of the retaining wall work.

C. Measurement and Payment.
1. The unit of measurement for furnishing the precast modular block retaining wall system shall be the vertical area of the wall face surface as measured from the top of the leveling pad to the top of the wall including coping. The final measured quantity shall include supply of all material components and the installation of the precast modular block system.
2. The final accepted quantities of the precast modular block retaining wall system will be compensated per the vertical face area as described above. The quantities of the precast modular block retaining wall as shown on the plans and as approved by the Owner shall be the basis for determination of the final payment quantity. Payment shall be made per square foot of vertical wall face.

1.03 REFERENCES

A. Where the specification and reference documents conflict, the Owner's designated representative will make the final determination of the applicable document.

B. Definitions:
1. Precast Modular Block (PMB) Unit – machine-placed, "wet cast" concrete modular block retaining wall facing unit.
2. Geotextile – a geosynthetic fabric manufactured for use as a separation and filtration medium between dissimilar soil materials.
3. Geogrid – a geosynthetic material comprised of a regular network of tensile elements manufactured in a mesh-like configuration of consistent aperture openings. When connected to the PMB facing units and placed in horizontal layers in compacted fill, the geogrid prevents lateral deformation of the retaining wall face and provides effective tensile reinforcement to the contiguous reinforced fill material.
4. Drainage Aggregate – clean, crushed stone placed within and immediately behind the precast modular block units to facilitate drainage and reduce compaction requirements immediately adjacent to and behind the precast modular block units.
5. Unit Core Fill – clean, crushed stone placed within the hollow vertical core of a precast modular block unit. Typically, the same material used for drainage aggregate as defined above.
6. Foundation Zone – soil zone immediately beneath the leveling pad and the reinforced zone.
7. Retained Zone – soil zone immediately behind the drainage aggregate and wall infill for wall sections designed as modular gravity structures. Alternatively, in the case of wall sections designed with geosynthetic soil reinforcement, the retained zone is the soil zone immediately behind the reinforced zone.
8. Reinforced Zone – structural fill zone within which successive horizontal layers of geogrid soil reinforcement have been placed to provide stability for the retaining wall face. The reinforced zone exists only for retaining wall sections that utilize geosynthetic soil reinforcement for stability.
9. Reinforced Fill – structural fill placed within the reinforced zone.
10. Leveling Pad – hard, flat surface upon which the bottom course of precast modular blocks are placed. The leveling pad may be constructed with crushed stone or cast-in-place concrete. A leveling pad is not a structural footing.
11. Wall Infill – the fill material placed and compacted between the drainage aggregate and the excavated soil face in retaining wall sections designed as modular gravity structures.

C. Reference Standards
1. Design
   a. AASHTO LRFD Bridge Design Specifications, 7th Edition, 2014.
   b. Minimum Design Loads for Buildings and Other Structures – ASCE/SEI 7-10.
   c. International Building Code, 2012 Edition.
   d. FHWA-NHI-10-024 Volume I and GEC 11 Design of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes.
   e. FHWA-NHI-10-025 Volume II and GEC 11 Design of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes.
2. Precast Modular Block Units
   a. ACI 201 – Guide to Durable Concrete

b. ACI 318 – Building Code Requirements for Structural Concrete
c. ASTM C33 – Standard Specification for Concrete Aggregates
d. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
e. ASTM C94 – Standard Specification for Ready-Mixed Concrete.
f. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
g. ASTM C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete.
h. ASTM C150 – Standard Specification for Portland Cement
i. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
j. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
k. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.
l. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
m. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
n. ASTM C666 – Standard Test Method for Concrete Resistance to Rapid Freezing and Thawing.
o. ASTM C845 - Standard Specification for Expansive Hydraulic Cement.
p. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
q. ASTM C989 - Standard Specification for Slag Cement for Use in Concrete and Mortars.
r. ASTM C1116 – Standard Specification for Fiber-Reinforced Concrete.
s. ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
t. ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
u. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
v. ASTM C1611 – Standard Test Method for Slump Flow of Self-Consolidating Concrete.
w. ASTM C1776 – Standard Specification for Wet-Cast Precast Modular Retaining Wall Units.
x. ASTM D6638 – Standard Test Method for Determining Connection Strength Between Geosynthetic Reinforcement and Segmental Concrete Units (Modular Concrete Blocks).
y. ASTM D6916 – Standard Test Method for Determining Shear Strength Between Segmental Concrete Units (Modular Concrete Blocks).

3. Geosynthetics
   a. AASHTO M 288 – Geotextile Specification for Highway Applications.
   b. ASTM D3786 – Standard Test Method for Bursting Strength of Textile Fabrics Diaphragm Bursting Strength Tester Method.
   c. ASTM D4354 – Standard Practice for Sampling of Geosynthetics for Testing.
   d. ASTM D4355 – Standard Test Method for Deterioration of Geotextiles
   e. ASTM D4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
   f. ASTM D4533 – Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
   g. ASTM D4595 – Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
   h. ASTM D4632 – Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
   i. ASTM D4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile.
   j. ASTM D4759 – Standard Practice for Determining Specification Conformance of Geosynthetics.
   k. ASTM D4833 – Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.

   l. ASTM D4873 – Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.
   m. ASTM D5262 – Standard Test Method for Evaluating the Unconfined Tension Creep and Creep Rupture Behavior of Geosynthetics.
   n. ASTM D5321 – Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method.
   o. ASTM D5818 – Standard Practice for Exposure and Retrieval of Samples to Evaluate Installation Damage of Geosynthetics.
   p. ASTM D6241 – Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.
   q. ASTM D6637 – Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method.
   r. ASTM D6706 – Standard Test Method for Measuring Geosynthetic Pullout Resistance in Soil.
   s. ASTM D6992 – Standard Test Method for Accelerated Tensile Creep and Creep-Rupture of Geosynthetic Materials Based on Time-Temperature Superposition Using the Stepped Isothermal Method.

4. Soils
   a. AASHTO M 145 – AASHTO Soil Classification System.
   b. AASHTO T 104 – Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.
   c. AASHTO T 267 – Standard Method of Test for Determination of Organic Content in Soils by Loss of Ignition.
   d. ASTM C33 – Standard Specification for Concrete Aggregates.
   e. ASTM D422 – Standard Test Method for Particle-Size Analysis of Soils.
   f. ASTM D448 – Standard Classification for Sizes of Aggregates for Road and Bridge Construction.
   g. ASTM D698 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort. (12,400 ft-lbf/ft (2,700 kN-m/m)).
   h. ASTM D1241 – Standard Specification for Materials for Soil-Aggregate Subbase, Base and Surface Courses.
   i. ASTM D1556 – Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
   j. ASTM D1557 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort. (56,000 ft-lbf/ft (2,700 kN-m/m)).
   k. ASTM D2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
   l. ASTM D2488 – Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).
   m. ASTM D3080 – Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions.
   n. ASTM D4254 – Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
   o. ASTM D4318 – Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
   p. ASTM D4767- Test Method for Consolidated-Undrained Triaxial Compression Test for Cohesive Soils.
   q. ASTM D4972 – Standard Test Method for pH of Soils.

r. ASTM D6938 – Standard Test Method for In-Place Density and Water Content of Soil and Aggregate by Nuclear Methods (Shallow Depth).
s. ASTM G51 – Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing.
t. ASTM G57 – Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method.

5. Drainage Pipe
   a. ASTM D3034 – Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
   b. ASTM F2648 – Standard Specification for 2 to 60 inch [50 to 1500 mm] Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preconstruction Meeting. As directed by the Owner, the General Contractor shall schedule a preconstruction meeting at the project site prior to commencement of retaining wall construction. Participation in the preconstruction meeting shall be required of the General Contractor, Retaining Wall Design Engineer, Retaining Wall Installation Contractor, Grading Contractor and Inspection Engineer. The General Contractor shall provide notification to all parties at least 10 calendar days prior to the meeting.

   1. Preconstruction Meeting Agenda:
      a. The Retaining Wall Design Engineer shall explain all aspects of the retaining wall construction drawings.
      b. The Retaining Wall Design Engineer shall explain the required bearing capacity of soil below the retaining wall structure and the shear strength of in-situ soils assumed in the retaining wall design to the Inspection Engineer.
      c. The Retaining Wall Design Engineer shall explain the required shear strength of fill soil in the reinforced, retained and foundation zones of the retaining wall to the Inspection Engineer.
      d. The Retaining Wall Design Engineer shall explain any measures required for coordination of the installation of utilities or other obstructions in the reinforced or retained fill zones of the retaining wall.
      e. The Retaining Wall Installation Contractor shall explain all excavation needs, site access and material staging area requirements to the General Contractor and Grading Contractor.

1.05 SUBMITTALS

A. Product Data. At least 14 days prior to construction, the General Contractor shall submit a minimum of six (6) copies of the retaining wall product submittal package to the Owner's Representative for review and approval. The submittal package shall include technical specifications and product data from the manufacturer for the following:
   1. Precast Modular Block System brochure
   2. Precast Modular Block concrete test results specified in paragraph 2.01, subparagraph B of this section as follows:
      a. 28-day compressive strength
      b. Air content
      c. Slump or Slump Flow (as applicable)
   3. Drainage Pipe

   4. Geotextile
   5. Geosynthetic Soil Reinforcement (if required by the retaining wall design). The contractor shall provide certified manufacturer test reports for the geosynthetic soil reinforcement material in the manufactured roll width specified. The test report shall list the individual roll numbers for which the certified material properties are valid.

B. Installer Qualification Data. At least 14 days prior to construction, the General Contractor shall submit the qualifications of the business entity responsible for installation of the retaining wall, the Retaining Wall Installation Contractor, per paragraph 1.07, subparagraph A of this section.

C. Retaining Wall Design Calculations and Construction Shop Drawings. At least 14 days prior to construction, the General Contractor shall furnish six (6) sets of construction shop drawings and six (6) copies of the supporting structural calculations report to the Owner for review and approval. This submittal shall include the following:
   1. Signed, sealed and dated drawings and engineering calculations prepared in accordance with these specifications.
   2. Qualifications Statement of Experience of the Retaining Wall Design Engineer as specified in paragraph 1.07, subparagraph B of this section.
   3. Certificate of Insurance of the Retaining Wall Design Engineer as specified in paragraph 1.06, subparagraph B of this section.

1.06 CONSTRUCTION SHOP DRAWING PREPARATION

A. The Retaining Wall Design Engineer shall coordinate the retaining wall construction shop drawing preparation with the project Civil Engineer, project Geotechnical Engineer and Owner's Representatives. The General Contractor shall furnish the Retaining Wall Design Engineer the following project information required to prepare the construction shop drawings. This information shall include, but is not limited to, the following:
   1. Current versions of the site, grading, drainage, utility, erosion control, landscape, and irrigation plans;
   2. electronic CAD file of the civil site plans listed in (1);
   3. report of geotechnical investigation and all addenda and supplemental reports;
   4. recommendations of the project Geotechnical Engineer regarding effective stress shear strength and total stress shear strength (when applicable) parameters for in-situ soils in the vicinity of the proposed retaining wall(s) and for any fill soil that may potentially be used as backfill in retained and/or foundation zones of the retaining wall.

B. The Retaining Wall Design Engineer shall provide the Owner with a certificate of professional liability insurance verifying the minimum coverage limits of $1 million per claim and $1 million aggregate.

C. Design of the precast modular block retaining wall shall satisfy the requirements of this section. Where local design or building code requirements exceed these specifications, the local requirements shall also be satisfied.

D. The Retaining Wall Design Engineer shall note any exceptions to the requirements of this section by listing them at the bottom right corner of the first page of the construction shop drawings.

E. Approval or rejection of the exceptions taken by the Retaining Wall Engineer will be made in writing as directed by the Owner.

F. The precast modular block design, except as noted herein, shall be based upon AASHTO Load and Resistance Factor Design (LRFD) methodology as referenced in paragraph 1.03, subparagraph C.1.

G. In the event that a conflict is discovered between these specifications and a reasonable interpretation of the design specifications and methods referenced in paragraph F above, these specifications shall prevail. If a reasonable interpretation is not possible, the conflict shall be resolved per the requirements in paragraph 1.03, subparagraph A of this section.

H. Soil Shear Parameters. The Retaining Wall Design Engineer shall prepare the construction shop drawings based upon soil shear strength parameters from the available project data and the recommendations of the project Geotechnical Engineer. If insufficient data exists to develop the retaining wall design, the Retaining Wall Design Engineer shall communicate the specific deficiency of the project information or data to the Owner in writing.

I. Allowable bearing pressure requirements for each retaining wall shall be clearly shown on the construction drawings.

J. Global Stability. Overall (global) stability shall be evaluated in accordance with the principals of limit equilibrium analysis as set forth in FHWA-NHI-10-024 Volume I and FHWA-NHI-10-025 Volume II GEC 11 Design of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes as referenced in paragraph 1.03, subparagraph C.1. The minimum factors of safety shall be as follows:

Normal Service (Static)	1.4
Seismic	1.1
Rapid Drawdown (if applicable)	1.2

K. Seismic Stability. Seismic loading shall be evaluated in accordance with AASHTO Load and Resistance Factor Design (LRFD) methodology as referenced in paragraph 1.03, subparagraph C.1.

1.07 QUALITY ASSURANCE

A. Retaining Wall Installation Contractor Qualifications. In order to demonstrate basic competence in the construction of precast modular block walls, the Retaining Wall Installation Contractor shall document compliance with the following:
   1. Experience.
      a. Construction experience with a minimum of 30,000 square feet (2,800 square meters) of the proposed precast modular block retaining wall system.
      b. Construction of at least ten (10) precast modular block (large block) retaining wall structures within the past three (3) years.
      c. Construction of at least 50,000 square feet (4,650 square meters) of precast modular block (large block) retaining walls within the past three (3) years.
   2. Retaining Wall Installation Contractor experience documentation for each qualifying project shall include:
      a. Project name and location

      b. Date (month and year) of construction completion
      c. Contact information of Owner or General Contractor
      d. Type (trade name) of precast modular block system built
      e. Maximum height of the wall constructed
      f. Face area of the wall constructed
   3. In lieu of the requirements set forth in items 1 and 2 above, the Retaining Wall Installation Contractor must be a certified Precast Modular Block Retaining Wall Installation Contractor as demonstrated by satisfactory completion of a certified precast modular block retaining wall installation training program administered by the precast modular block manufacturer.

B. Retaining Wall Design Engineer Qualifications and Statement of Experience. The Retaining Wall Design Engineer shall submit a written statement affirming that he or she has the following minimum qualifications and experience.
   1. The Retaining Wall Design Engineer shall be licensed to practice in the jurisdiction of the project location.
   2. The Retaining Wall Design Engineer shall be independently capable of performing all internal and external stability analyses, including those for seismic loading, compound stability, rapid draw-down and deep-seated, global modes of failure.
   3. The Retaining Wall Design Engineer shall affirm in writing that he or she has personally supervised the design of the retaining walls for the project, that the design considers all the requirements listed in paragraph 1.06 and that he or she accepts responsibility as the design engineer of record for the retaining walls constructed on the project.
   4. The Retaining Wall Design Engineer shall affirm in writing that he or she has personally designed in excess of 100,000 face square feet (9,000 face square meters) of modular block earth retaining walls within the previous three (3) years.
   5. In lieu of these specific requirements, the engineer may submit alternate documentation demonstrating competency in Precast Modular Block retaining wall design.

C. The Owner reserves the right to reject the design services of any engineer or engineering firm who, in the sole opinion of the Owner, does not possess the requisite experience or qualifications.

1.08 QUALITY CONTROL

A. The Owner's Representative shall review all submittals for materials, design, Retaining Wall Design Engineer qualifications and the Retaining Wall Installation Contractor qualifications.

B. The General Contractor shall retain the services of an Inspection Engineer who is experienced with the construction of precast modular block retaining wall structures to perform inspection and testing. The cost of inspection shall be the responsibility of the General Contractor. Inspection shall be continuous throughout the construction of the retaining walls.

C. The Inspection Engineer shall perform the following duties:
   1. Inspect the construction of the precast modular block structure for conformance with construction shop drawings and the requirements of this specification.
   2. Verify that soil or aggregate fill placed and compacted in the reinforced, retained and foundation zones of the retaining wall conforms with paragraphs 2.04 and 2.05 of this section and exhibits the shear strength parameters specified by the Retaining Wall Design Engineer.

3. Verify that the shear strength of the in-situ soil assumed by the Retaining Wall Design Engineer is appropriate.
4. Inspect and document soil compaction in accordance with these specifications:
   a. Required dry unit weight
   b. Actual dry unit weight
   c. Allowable moisture content
   d. Actual moisture content
   e. Pass/fail assessment
   f. Test location – wall station number
   g. Test elevation
   h. Distance of test location behind the wall face
5. Verify that all excavated slopes in the vicinity of the retaining wall are bench-cut as directed by the project Geotechnical Engineer.
6. Notify the Retaining Wall Installation Contractor of any deficiencies in the retaining wall construction and provide the Retaining Wall Installation Contractor a reasonable opportunity to correct the deficiency.
7. Notify the General Contractor, Owner and Retaining Wall Design Engineer of any construction deficiencies that have not been corrected timely.
8. Document all inspection results.
9. Test compacted density and moisture content of the retained backfill with the following frequency:
   a. At least once every 1,000 square feet (90 square meters) (in plan) per 9-inch (230 mm) vertical lift, and
   b. At least once per every 18 inches (460 mm) of vertical wall construction.

D. The General Contractor's engagement of the Inspection Engineer does not relieve the Retaining Wall Installation Contractor of responsibility to construct the proposed retaining wall in accordance with the approved construction shop drawings and these specifications.

E. The Retaining Wall Installation Contractor shall inspect the on-site grades and excavations prior to construction and notify the Retaining Wall Design Engineer and General Contractor if on-site conditions differ from the elevations and grading conditions depicted in the retaining wall construction shop drawings.

1.09 DELIVERY, STORAGE AND HANDLING

A. The Retaining Wall Installation Contractor shall inspect the materials upon delivery to ensure that the proper type, grade and color of materials have been delivered.

B. The Retaining Wall Installation Contractor shall store and handle all materials in accordance with the manufacturer's recommendations as specified herein and in a manner that prevents deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, UV exposure or other causes. Damaged materials shall not be incorporated into the work.

C. Geosynthetics
   1. All geosynthetic materials shall be handled in accordance with ASTM D4873. The materials should be stored off the ground and protected from precipitation, sunlight, dirt and physical damage.

D. Precast Modular Blocks
   1. Precast modular blocks shall be stored in an area with positive drainage away from the blocks. Be careful to protect the block from mud and excessive chipping and breakage. Precast modular blocks shall not be stacked more than three (3) units high in the storage area.

E. Drainage Aggregate and Backfill Stockpiles
   1. Drainage aggregate or backfill material shall not be piled over unstable slopes or areas of the project site with buried utilities.
   2. Drainage aggregate and/or reinforced fill material shall not be staged where it may become mixed with or contaminated by poor draining fine-grained soils such as clay or silt.

PART 2 – MATERIALS

2.01 PRECAST MODULAR BLOCK RETAINING WALL UNITS

A. All units shall be wet-cast precast modular retaining wall units conforming to ASTM C1776.

B. All units for the project shall be obtained from the same manufacturer. The manufacturer shall be licensed and authorized to produce the retaining wall units by the precast modular block system patent holder/licensor and shall document compliance with the published quality control standards of the proprietary precast modular block system licensor for the previous three (3) years or the total time the manufacturer has been licensed, whichever is less.

C. Concrete used in the production of the precast modular block units shall be first-purpose, fresh concrete. It shall not consist of returned, reconstituted, surplus or waste concrete. It shall be an original production mix meeting the requirements of ASTM C94 and exhibit the properties as shown in the following table:

Concrete Mix Properties

Freeze Thaw Exposure Class[1]	Minimum 28-Day Compressive Strength[2]	Maximum Water Cement Ratio	Nominal Maximum Aggregate Size	Aggregate Class Designation[3]	Air Content[4]
Moderate	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3M	4.5% +/- 1.5%
Severe	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3S	6.0% +/- 1.5%
Very Severe	4,500 psi (30.0 MPa)	0.40	1 inch (25 mm)	4S	6.0% +/- 1.5%
Maximum Water-Soluble Chloride Ion (Cl^-) Content in Concrete, Percent by Weight of Cement[5,6]					0.15
Maximum Chloride as Cl^- Concentration in Mixing Water, Parts Per Million					1000
Maximum Percentage of Total Cementitious Materials By Weight [7,9] (Very Severe Exposure Class Only):					
Fly Ash or Other Pozzolans Conforming to ASTM C618					25
Slag Conforming to ASTM C989					50
Silica Fume Conforming to ASTM C1240					10
Total of Fly Ash or Other Pozzolans, Slag, and Silica Fume[8]					50
Total of Fly Ash or Other Pozzolans and Silica Fume[8]					35
Alkali-Aggregate Reactivity Mitigation per ACI 201					
Slump (Conventional Concrete) per ASTM C143[10]			5 inches +/- 1½ inches (125 mm +/- 40 mm)		
Slump Flow (Self-Consolidating Concrete) per ASTM C1611			18 inches – 32 inches (450 mm – 800 mm)		

[1]Exposure class is as described in ACI 318. "Moderate" describes concrete that is exposed to freezing and thawing cycles and occasional exposure to moisture. "Severe" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture. "Very Severe" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture and exposed to deicing chemicals. Exposure class should be specified by owner/purchaser prior to order placement.
[2]Test method ASTM C39.
[3]Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregates for Concrete*.
[4]Test method ASTM C231.
[5]Test method ASTM C1218 at age between 28 and 42 days.
[6]Where used in high sulfate environments or where alkali-silica reactivity is an issue, water soluble chloride shall be limited to no more than trace amounts (from impurities in concrete-making components, not intended constituents.)
[7]The total cementitious material also includes ASTM C150, C595, C845, C1157 cement. The maximum percentages shall include:
(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.
(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.
(c) Silica fume, ASTM C1240, present in a blended cement.
[8]Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.
[9]Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze/thaw durability in a detailed and current testing program.
[10]Slump may be increased by a high-range water-reducing admixture.

D. Each concrete block shall be cast in a single continuous pour without cold joints. With the exception of half-block units, corner units and other special application units, the precast modular block units shall conform to the nominal dimensions listed in the table below and be produced to the dimensional tolerances shown.

Block Type	Dimension	Nominal Value	Tolerance
28" (710 mm) Block	Height	18" (457 mm)	+/- 3/16" (5 mm)
	Length	46-1/8" (1172 mm)	+/- 1/2" (13 mm)
	Width*	28" (710 mm)	+/- 1/2" (13 mm)
41" (1030 mm) Block	Height	18" (457 mm)	+/- 3/16" (5 mm)
	Length	46-1/8" (1172 mm)	+/- 1/2" (13 mm)
	Width*	40-1/2" (1030 mm)	+/- 1/2" (13 mm)
60" (1520 mm) Block	Height	18" (457 mm)	+/- 3/16" (5 mm)
	Length	46-1/8" (1172 mm)	+/- 1/2" (13 mm)
	Width*	60" (1520 mm)	+/- 1/2" (13 mm)

* Block tolerance measurements shall exclude variable face texture

E. Individual block units shall have a nominal height of 18 inches (457 mm).

F. With the exception of half-block units, corner units and other special application units, the precast modular block units shall have two (2), circular dome shear knobs that are 10 inches (254 mm), 7.5 inches (190 mm), or 6.75 inches (171 mm) in diameter and 4 inches (102 mm) or 2 inches (51 mm) in height. The shear knobs shall fully index into a continuous semi-cylindrical shear channel in the bottom of the block course above. ThePeak interlock shear between any two (2) vertically stacked precast modular block units, with 10 inch (254 mm) diameter shear knobs, measured in accordance with ASTM D6916 shall exceed 6,500 lb/ft (95 kN/m) at a minimum normal load of 500 lb/ft (7kN/m). as well as an ultimate peak interface shear capacity in excess of 11,000 lb/ft (160 kN/m). The peak interlock shear between any two (2) vertically stacked precast modular block units, with 7.5 inch (190 mm) or 6.75 inch (171 mm) diameter shear knobs, measured in accordance with ASTM D6916 shall exceed 1,850 lb/ft (27 kN/m) at a minimum normal load of 500 lb/ft (7kN/m) as well as an ultimate peak interface shear capacity in excess of 10,000 lb/ft (146 kN/m).Test specimen blocks tested under ASTM D6916 shall be actual, full-scale production blocks of known compressive strength. The interface shear capacity reported shall be corrected for a 4,000 psi (27.6 MPa) concrete compressive strength. Regardless of precast modular block configuration, interface shear testing shall be completed without the inclusion of unit core infill aggregate.

G. The 28" (710 mm) and 41" (1030 mm) precast modular block units shall be cast with a 13" (330 mm) wide, continuous vertical core slot that will permit the insertion of a 12" (305 mm) inch wide strip of geogrid reinforcement to pass completely through the block. When installed in this manner, the geogrid reinforcement shall form a non-normal load dependent, positive connection between the block unit and the reinforcement strip. The use of steel for the purposes of creating the geogrid to block connection is not acceptable.

H. Without field cutting or special modification, the precast modular block units shall be capable of achieving a minimum radius of 14 ft 6 in (4.42 m).

I. The precast modular block units shall be manufactured with an integrally cast shear knobs that establishes a standard horizontal set-back for subsequent block courses. The precast modular block system shall be available in the four (4) standard horizontal set-back facing batter options listed below:

Horizontal Set-Back/Blk. Course	Max. Facing Batter
3/8" (10 mm)	1.2˚

1-5/8” (41 mm)	5.2˚
9-3/8” (238 mm)	27.5˚
16-5/8” (422 mm)	42.7˚

The precast modular block units shall be furnished with the required shear knobs that provide the facing batter required in the construction shop drawings.

J. The precast modular block unit face texture shall be selected by the owner from the available range of textures available from the precast modular block manufacturer. Each textured block facing unit shall be a minimum of 5.76 square feet (0.54 square meters) with a unique texture pattern that repeats with a maximum frequency of once in any 15 square feet (1.4 square meters) of wall face.

K. The block color shall be selected by the owner from the available range of colors available from the precast modular block manufacturer.

L. All precast modular block units shall be sound and free of cracks or other defects that would interfere with the proper installation of the unit, impair the strength or performance of the constructed wall. PMB units to be used in exposed wall construction shall not exhibit chips or cracks in the exposed face or faces of the unit that are not otherwise permitted. Chips smaller than 1.5” (38 mm) in its largest dimension and cracks not wider than 0.012” (0.3 mm) and not longer than 25% of the nominal height of the PMB unit shall be permitted. PMB units with bug holes in the exposed architectural face smaller than 0.75” (19 mm) in its largest dimension shall be permitted. Bug holes, water marks, and color variation on non-architectural faces are acceptable. PMB units that exhibit cracks that are continuous through any solid element of the PMB unit shall not be incorporated in the work regardless of the width or length of the crack.

M. Preapproved Manufacturers.
Manufacturers of Redi-Rock Retaining Wall Systems as licensed by Redi-Rock International, LLC, 05481 US 31 South, Charlevoix, MI 49720 USA; telephone (866) 222-8400; website www.redi-rock.com.

N. Substitutions. Technical information demonstrating conformance with the requirements of this specification for an alternative precast modular block retaining wall system must be submitted for preapproval at least 14 calendar days prior to the bid date. Acceptable alternative PMB retaining wall systems, otherwise found to be in conformance with this specification, shall be approved in writing by the owner 7 days prior to the bid date. The Owner’s Representative reserves the right to provide no response to submissions made out of the time requirements of this section or to submissions of block retaining wall systems that are determined to be unacceptable to the owner.

O. Value Engineering Alternatives. The owner may evaluate and accept systems that meet the requirements of this specification after the bid date that provide a minimum cost savings of 20% to the Owner. Construction expediency will not be considered as a contributing portion of the cost savings total.

2.02 GEOGRID REINFORCEMENT

A. Geogrid reinforcement shall be a woven or knitted PVC coated geogrid manufactured from high-tenacity PET polyester fiber with an average molecular weight greater than 25,000 (M_n > 25,0000) and a carboxyl end group less than 30 (CEG < 30). The geogrid shall be furnished in prefabricated

roll widths of certified tensile strength by the manufacturer. The prefabricated roll width of the geogrid shall be 12” (300 mm) +/- 1/2” (13 mm). No cutting of geogrid reinforcement down to the 12” (300 mm) roll width from a larger commercial roll width will be allowed under any circumstances.

B. The ultimate tensile strength (T_{ult}) of the geogrid reinforcement shall be measured in accordance with ASTM D6637.

C. Geogrid – Soil Friction Properties
1. Friction factor, F*, shall be equal to 2/3 Tan ϕ, where ϕ is the effective angle of internal friction of the reinforced fill soil.
2. Linear Scale Correction Factor, α, shall equal 0.8.

D. Long-Term Tensile Strength (T_{al}) of the geogrid reinforcement shall be calculated in accordance with Section 3.5.2 of FHWA-NHI-10-024 and as provided in this specification.
1. The creep reduction factor (RF_{CR}) shall be determined in accordance with Appendix D of FHWA-NHI-10-025 for a minimum 75 year design life.
2. Minimum installation damage reduction factor (RF_{ID}) shall be 1.25. The value of RF_{ID} shall be based upon documented full-scale tests in a soil that is comparable to the material proposed for use as reinforced backfill in accordance with ASTM D5818.
3. Minimum durability reduction factor (RF_D) shall be 1.3 for a soil pH range of 3 to 9.

E. Connection between the PMB retaining wall unit and the geogrid reinforcement shall be determined from short-term testing per the requirements of FHWA NHI-10-025, Appendix B.4 for a minimum 75-year design life.

F. The minimum value of T_{al} for geogrid used in design of a reinforced precast modular block retaining wall shall be 2,000 lb/ft (29 kN/m) or greater.

G. The minimum length of geogrid reinforcement shall be the greater of the following:
1. 0.7 times the wall design height, H.
2. 6 feet (1.83 m).
3. The length required by design to meet internal stability requirements, soil bearing pressure requirements and constructability requirements.

H. Constructability Requirements. Geogrid design embedment length shall be measured from the back of the precast modular block facing unit and shall be consistent for the entire height of a given retaining wall section.

I. Geogrid shall be positively connected to every precast modular block unit. Design coverage ratio, Rc, as calculated in accordance with AASHTO LRFD Bridge Design Specifications Figure 11.10.6.4.1-2 shall not exceed 0.50.

J. Preapproved Geogrid Reinforcement Products.
1. Miragrid XT Geogrids as manufactured by TenCate Geosynthetics of Pendergrass, Georgia USA and distributed by Manufacturers of the Redi-Rock Retaining Wall System.

K. Substitutions. No substitutions of geogrid reinforcement products shall be allowed.

2.03 GEOTEXTILE

A. Nonwoven geotextile fabric shall be placed as indicated on the retaining wall construction shop drawings. Additionally, the nonwoven geotextile fabric shall be placed in the v-shaped joint between adjacent block units on the same course. The nonwoven geotextile fabric shall meet the requirements Class 3 construction survivability in accordance with AASHTO M 288.

B. Preapproved Nonwoven Geotextile Products
   1. Mirafi 140N
   2. Propex Geotex 451
   3. Skaps GT-142
   4. Thrace-Linq 140EX
   5. Carthage Mills FX-40HS
   6. Stratatex ST 142

2.04 DRAINAGE AGGREGATE AND WALL INFILL

A. Drainage aggregate (and wall infill for retaining walls designed as modular gravity structures) shall be a durable crushed stone conforming to No. 57 size per ASTM C33 with the following particle-size distribution requirements per ASTM D422:

U.S. Standard Sieve Size	% Passing
1-½” (38 mm)	100
1” (25 mm)	95-100
½” (13 mm)	25-60
No. 4 (4.76 mm)	0-10
No. 8 (2.38 mm)	0-5

2.05 REINFORCED FILL

A. Material used as reinforced backfill material in the reinforced zone (if applicable) shall be a granular fill material meeting the requirements of USCS soil type GW, GP, SW or SP per ASTM D2487 or alternatively by AASHTO Group Classification A-1-a or A-3 per AASHTO M 145. The backfill shall exhibit a minimum effective internal angle of friction, ϕ = 34 degrees at a maximum 2% shear strain and meet the following particle-size distribution requirements per ASTM D422.

U.S. Standard Sieve Size	% Passing
3/4” (19 mm)	100
No. 4 (4.76 mm)	0-100
No. 40 (0.42 mm)	0-60
No. 200 (0.07 mm)	0-15

B. The reinforced backfill material shall be free of sod, peat, roots or other organic or deleterious matter including, but not limited to, ice, snow or frozen soils. Materials passing the No. 40 (0.42 mm) sieve shall have a liquid limit less than 25 and plasticity index less than 6 per ASTM D4318. Organic content in the backfill material shall be less than 1% per AASHTO T-267 and the pH of the backfill material shall be between 5 and 8.

C. Soundness. The reinforced backfill material shall exhibit a magnesium sulfate soundness loss of less than 30% after four (4) cycles, or sodium sulfate soundness loss of less than 15% after five (5) cycles as measured in accordance with AASHTO T-104.

D. Reinforced backfill shall not be comprised of crushed or recycled concrete, recycled asphalt, bottom ash, shale or any other material that may degrade, creep or experience a loss in shear strength or a change in pH over time.

2.06 LEVELING PAD

A. The precast modular block units shall be placed on a leveling pad constructed from crushed stone or unreinforced concrete. The leveling pad shall be constructed to the dimensions and limits shown on the retaining wall design drawings prepared by the Retaining Wall Design Engineer.

B. Crushed stone used for construction of a granular leveling pad shall meet the requirements of the drainage aggregate and wall infill in section 2.04 or a preapproved alternate material.

C. Concrete used for construction of an unreinforced concrete leveling pad shall satisfy the criteria for AASHTO Class B. The concrete should be cured a minimum of 12 hours prior to placement of the precast modular block wall retaining units and exhibit a minimum 28-day compressive strength of 2,500 psi (17.2 MPa).

2.07 DRAINAGE

A. Drainage Pipe
   1. Drainage collection pipe shall be a 4” (100 mm) diameter, 3-hole perforated, HDPE pipe with a minimum pipe stiffness of 22 psi (152 kPa) per ASTM D2412.
   2. The drainage pipe shall be manufactured in accordance with ASTM D1248 for HDPE pipe and fittings.

B. Preapproved Drainage Pipe Products
   1. ADS 3000 Triple Wall pipe as manufactured by Advanced Drainage Systems.

PART 3 – EXECUTION

3.01 GENERAL

A. All work shall be performed in accordance with OSHA safety standards, state and local building codes and manufacturer’s requirements.

B. The General Contractor is responsible for the location and protection of all existing underground utilities. Any new utilities proposed for installation in the vicinity of the retaining wall, shall be installed concurrent with retaining wall construction. The General Contractor shall coordinate the work of subcontractors affected by this requirement.

C. New utilities installed below the retaining wall shall be backfilled and compacted to a minimum of 98% maximum dry density per ASTM D698 standard proctor.

D. The General Contractor is responsible to ensure that safe excavations and embankments are maintained throughout the course of the project.

E. All work shall be inspected by the Inspection Engineer as directed by the Owner.

3.02 EXAMINATION

A. Prior to construction, the General Contractor, Grading Contractor, Retaining Wall Installation Contractor and Inspection Engineer shall examine the areas in which the retaining wall will be constructed to evaluate compliance with the requirements for installation tolerances, worker safety and any site conditions affecting performance of the completed structure. Installation shall proceed only after unsatisfactory conditions have been corrected.

3.03 PREPARATION

A. Fill Soil.
   1. The Inspection Engineer shall verify that reinforced backfill placed in the reinforced soil zone satisfies the criteria of this section.
   2. The Inspection Engineer shall verify that any fill soil installed in the foundation and retained soil zones of the retaining wall satisfies the specification of the Retaining Wall Design Engineer as shown on the construction drawings.

B. Excavation.
   1. The Grading Contractor shall excavate to the lines and grades required for construction of the precast modular block retaining wall as shown on the construction drawings. The Grading Contractor shall minimize over-excavation. Excavation support, if required, shall be the responsibility of the Grading Contractor.
   2. Over-excavated soil shall be replaced with compacted fill in conformance with the specifications of the Retaining Wall Design Engineer and “Division 31, Section 31 20 00 – Earthmoving” of these project specifications.
   3. Embankment excavations shall be bench cut as directed by the project Geotechnical Engineer and inspected by the Inspection Engineer for compliance.

C. Foundation Preparation.
   1. Prior to construction of the precast modular block retaining wall, the leveling pad area and undercut zone (if applicable) shall be cleared and grubbed. All topsoil, brush, frozen soil and organic material shall be removed. Additional foundation soils found to be unsatisfactory beyond the specified undercut limits shall be undercut and replaced with approved fill as directed by the project Geotechnical Engineer. The Inspection Engineer shall ensure that the undercut limits are consistent with the requirements of the project Geotechnical Engineer and that all soil fill material is properly compacted according project specifications. The Inspection Engineer shall document the volume of undercut and replacement.
   2. Following excavation for the leveling pad and undercut zone (if applicable), the Inspection Engineer shall evaluate the in-situ soil in the foundation and retained soil zones.
      a. The Inspection Engineer shall verify that the shear strength of the in-situ soil assumed by the Retaining Wall Design Engineer is appropriate. The Inspection Engineer shall immediately stop work and notify the Owner if the in-situ shear strength is found to be inconsistent with the retaining wall design assumptions.

      b. The Inspection Engineer shall verify that the foundation soil exhibits sufficient ultimate bearing capacity to satisfy the requirements indicated on the retaining wall construction shop drawings per paragraph 1.06 I of this section.

D. Leveling Pad.
   1. The leveling pad shall be constructed to provide a level, hard surface on which to place the first course of precast modular block units. The leveling pad shall be placed in the dimensions shown on the retaining wall construction drawings and extend to the limits indicated.
   2. Crushed Stone Leveling Pad. Crushed stone shall be placed in uniform maximum lifts of 6” (150 mm). The crushed stone shall be compacted by a minimum of 3 passes of a vibratory compactor capable of exerting 2,000 lb (8.9 kN) of centrifugal force and to the satisfaction of the Inspection Engineer.
   3. Unreinforced Concrete Leveling Pad. The concrete shall be placed in the same dimensions as those required for the crushed stone leveling pad. The Retaining Wall Installation Contractor shall erect proper forms as required to ensure the accurate placement of the concrete leveling pad according to the retaining wall construction drawings.

3.04 PRECAST MODULAR BLOCK WALL SYSTEM INSTALLATION

A. The precast modular block structure shall be constructed in accordance with the construction drawings, these specifications and the recommendations of the retaining wall system component manufacturers. Where conflicts exist between the manufacturer’s recommendations and these specifications, these specifications shall prevail.

B. Drainage components. Pipe, geotextile and drainage aggregate shall be installed as shown on the construction shop drawings.

C. Precast Modular Block Installation
   1. The first course of block units shall be placed with the front face edges tightly abutted together on the prepared leveling pad at the locations and elevations shown on the construction drawings. The Retaining Wall Installation Contractor shall take special care to ensure that the bottom course of block units are in full contact with the leveling pad, are set level and true and are properly aligned according to the locations shown on the construction drawings.
   2. Backfill shall be placed in front of the bottom course of blocks prior to placement of subsequent block courses. Nonwoven geotextile fabric shall be placed in the V-shaped joints between adjacent blocks. Drainage aggregate shall be placed in the V-shaped joints between adjacent blocks to a minimum distance of 12” (300 mm) behind the block unit.
   3. Drainage aggregate shall be placed in 9 inch maximum lifts and compacted by a minimum of three (3) passes of a vibratory plate compactor capable exerting a minimum of 2,000 lb (8.9 kN) of centrifugal force.
   4. Unit core fill shall be placed in the precast modular block unit vertical core slot. The core fill shall completely fill the slot to the level of the top of the block unit. The top of the block unit shall be broom-cleaned prior to placement of subsequent block courses. No additional courses of precast modular blocks may be stacked before the unit core fill is installed in the blocks on the course below.
   5. Base course blocks for gravity wall designs (without geosynthetic soil reinforcement) may be furnished without vertical core slots. If so, disregard item 4 above, for the base course blocks in this application.

6. Nonwoven geotextile fabric shall be placed between the drainage aggregate and the retained soil (gravity wall design) or between the drainage aggregate and the reinforced fill (reinforced wall design) as required on the retaining wall construction drawings.
7. Subsequent courses of block units shall be installed with a running bond (half block horizontal course-to-course offset). With the exception of 90 degree corner units, the shear channel of the upper block shall be fully engaged with the shear knobs of the block course below. The upper block course shall be pushed forward to fully engage the interface shear key between the blocks and to ensure consistent face batter and wall alignment. Geogrid, drainage aggregate, unit core fill, geotextile and properly compacted backfill shall be complete and in-place for each course of block units before the next course of blocks is stacked.
8. The elevation of retained soil fill shall not be less than 1 block course (18” (457 mm)) below the elevation of the reinforced backfill throughout the construction of the retaining wall.
9. If included as part of the precast modular block wall design, cap units shall be secured with an adhesive in accordance with the precast modular block manufacturer’s recommendation.

D. Geogrid Reinforcement Installation (if required)
1. Geogrid reinforcement shall be installed at the locations and elevations shown on the construction drawings on level fill compacted to the requirements of this specification.
2. Continuous 12” (300 mm) wide strips of geogrid reinforcement shall be passed completely through the vertical core slot of the precast modular block unit and extended to the embedment length shown on the construction plans. The strips shall be staked or anchored as necessary to maintain a taut condition.
3. Reinforcement length (L) of the geogrid reinforcement is measured from the back of the precast modular block unit. The cut length (L_c) is two times the reinforcement length plus additional length through the block facing unit. The cut length is calculated as follows:

L_c = 2*L + 3 ft (2*L + 0.9 m) (28” (710 mm) block unit)
L_c = 2*L + 5 ft (2*L + 1.5 m) (41” (1030 mm) block unit)

4. The geogrid strip shall be continuous throughout its entire length and may not be spliced. The geogrid shall be furnished in nominal, prefabricated roll widths of 12” (300 mm)+/- ½” (13 mm). No field modification of the geogrid roll width shall be permitted.
5. Neither rubber tire nor track vehicles may operate directly on the geogrid. Construction vehicle traffic in the reinforced zone shall be limited to speeds of less than 5 mph (8 km/hr) once a minimum of 9 inches (230 mm) of compacted fill has been placed over the geogrid reinforcement. Sudden braking and turning of construction vehicles in the reinforced zone shall be avoided.

E. Construction Tolerance. Allowable construction tolerance of the retaining wall shall be as follows:
1. Deviation from the design batter and horizontal alignment, when measured along a 10’ (3 m) straight wall section, shall not exceed 3/4” (19 mm).
2. Deviation from the overall design batter shall not exceed 1/2“ (13 mm) per 10’ (3 m) of wall height.
3. The maximum allowable offset (horizontal bulge) of the face in any precast modular block joint shall be 1/2” (13 mm).
4. The base of the precast modular block wall excavation shall be within 2” (50 mm) of the staked elevations, unless otherwise approved by the Inspection Engineer.
5. Differential vertical settlement of the face shall not exceed 1’ (300 mm) along any 200’ (61 m) of wall length.

6. The maximum allowable vertical displacement of the face in any precast modular block joint shall be 1/2“ (13 mm).
7. The wall face shall be placed within 2” (50 mm) of the horizontal location staked.

3.05 WALL INFILL AND REINFORCED BACKFILL PLACEMENT

A. Backfill material placed immediately behind the drainage aggregate shall be compacted as follows:
1. 98% of maximum dry density at ± 2% optimum moisture content per ASTM D698 standard proctor or 85% relative density per ASTM D4254.

B. Compactive effort within 3’ (0.9 m) of the back of the precast modular blocks should be accomplished with walk-behind compactors. Compaction in this zone shall be within 95% of maximum dry density as measured in accordance with ASTM D698 standard proctor or 80% relative density per ASTM D 4254. Heavy equipment should not be operated within 3’ (0.9 m) of the back of the precast modular blocks.

C. Backfill material shall be installed in lifts that do not exceed a compacted thickness of 9” (230 mm).

D. At the end of each work day, the Retaining Wall Installation Contractor shall grade the surface of the last lift of the granular wall infill to a 3% ± 1% slope away from the precast modular block wall face and compact it.

E. The General Contractor shall direct the Grading Contractor to protect the precast modular block wall structure against surface water runoff at all times through the use of berms, diversion ditches, silt fence, temporary drains and/or any other necessary measures to prevent soil staining of the wall face, scour of the retaining wall foundation or erosion of the reinforced backfill or wall infill.

3.06 OBSTRUCTIONS IN THE INFILL AND REINFORCED FILL ZONE

A. The Retaining Wall Installation Contractor shall make all required allowances for obstructions behind and through the wall face in accordance with the approved construction shop drawings.

B. Should unplanned obstructions become apparent for which the approved construction shop drawings do not account, the affected portion of the wall shall not be constructed until the Retaining Wall Design Engineer can appropriately address the required procedures for construction of the wall section in question.

3.07 COMPLETION

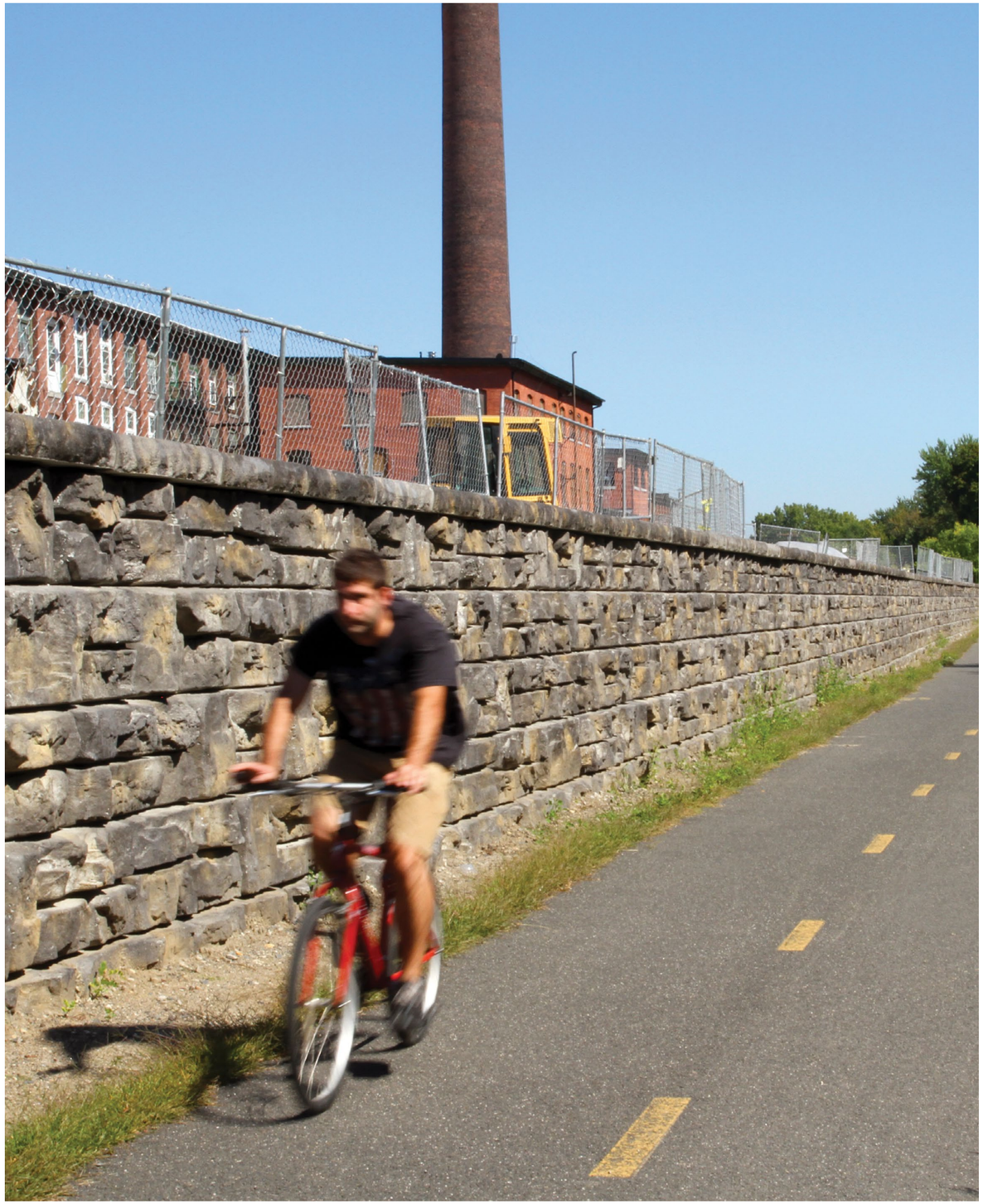
A. For walls supporting unpaved areas, a minimum of 12” (300 mm) of compacted, low-permeability fill shall be placed over the granular wall infill zone of the precast modular block retaining wall structure. The adjacent retained soil shall be graded to prevent ponding of water behind the completed retaining wall.

B. For retaining walls with crest slopes of 5H:1V or steeper, silt fence shall be installed along the wall crest immediately following construction. The silt fence shall be located 3’ to 4’ (0.9 m to 1.2 m) behind the uppermost precast modular block unit. The crest slope above the wall shall be immediately seeded to establish vegetation. The General Contractor shall ensure that the seeded slope receives adequate irrigation and erosion protection to support germination and growth.

C. The General Contractor shall confirm that the as-built precast modular block wall geometries conform to the requirements of this section. The General Contractor shall notify the Owner of any deviations.

END OF SECTION 32 32 16

Project: Rail Trail Bike Path Project #182 ***Owner:*** Mike Michon ***Design Engineer:*** Eric Merluzzi, P.E. ***Project Engineer:*** R. Levesque Associates RLA ***Installer:*** Geeleher Enterprises, Inc. ***Manufacturer:*** Redi-Rock Walls of New England ***Location:*** Easthampton, MA ***Completed:*** 2015



INSTALLATION GUIDE

1. PURPOSE

This manual is intended to serve as a guide for the proper installation and construction of a Redi-Rock® retaining wall. The recommendations and guidelines presented here are intended to supplement detailed construction documents, plans, and specifications for the project.

2. RESPONSIBILITIES

Redi-Rock supports a Total Quality Management approach to Quality Assurance and Quality Control (QA/QC) in the planning, design, manufacture, installation, and final acceptance of a Redi-Rock wall. This approach requires the responsible party at each stage of the project ensure that proper procedures are followed for their portion of the work. The responsible parties during the construction phase of a Redi-Rock wall include the Contractor, Engineer or Owner's Representative, and Redi-Rock licensed manufacturer. Their specific responsibilities for compliance are as follows:

CONTRACTOR

The Contractor is responsible for providing construction according to the contract documents, plans, and specifications for the project. The Contractor shall ensure that employees engaged in construction of the Redi-Rock wall understand and follow the project plans and specifications, are familiar with construction methods required, and have adequate safety training.

ENGINEER OR OWNER'S REPRESENTATIVE

The Engineer or Owner's Representative is responsible for construction review to assure that the project is being constructed according to the contract documents (plans and specifications). The representative shall fully understand the project plans and specifications and shall perform adequate field verification checks to ensure construction is in conformance with the project requirements. The presence of the Engineer or Owner's representative does not relieve the Contractor of their responsibilities for compliance with the project plans and specifications.

REDI-ROCK LICENSED MANUFACTURER

Redi-Rock blocks are produced by independently-owned licensed manufacturers. The manufacturer is responsible for the production and delivery of Redi-Rock units to the job site in accordance with published material quality, size tolerances, construction documents, plans, and specifications. The licensed manufacturer is responsible for adherence to any project specific QA/QC requirements for the production of precast concrete retaining wall units. Often, additional services—such as installation training classes—are available through the Redi-Rock manufacturer.

3. PRE-CONSTRUCTION CHECKLIST

Before you start construction of a Redi-Rock wall, take the time to complete necessary planning and preparation. This process will help ensure a safe, efficient, and quality installation. It will also help avoid costly mistakes.

☐ SAFETY

Safety is of primary concern to Redi-Rock International. Redi-Rock walls must be installed in a safe manner. All local, state, and federal safety regulations must be followed. In addition, Redi-Rock International greatly encourages installers to set up company programs to help their people stay safe at work. These programs should address items such as: personal protective equipment, maintaining safe slopes and excavations, fall protection, rigging and lifting, and other safety precautions. Safety-training materials specific to your company can be found at **www.osha.gov**, by calling 1-800-321-OSHA (6742), or from your local government safety office.

☐ ENGINEERING AND PERMITS

Obtain necessary engineering and permits for your project. Your local building department is an excellent resource to help determine the requirements for your project.

This installation guide is intended to supplement a detailed, site-specific wall design prepared for your project by a Professional Engineer. The construction documents for your project supersede any recommendations presented here.

☐ REVIEW THE PROJECT PLANS

Take the time to review and understand the project plans and specifications. Make sure that the plans take into account current site, soil, and water conditions. Pay close attention to silty or clayey soils and ground water or surface water on the site as these can significantly increase the forces on the wall. A pre-construction meeting with the wall design engineer, construction inspector, wall contractor, and owner or representative is recommended.

☐ CONSTRUCTION PLANNING

Develop a plan to coordinate construction activities on your site. Make sure your plan specifically addresses how to control surface water during construction.

☐ UTILITY LOCATION

Make sure to have underground utilities located and marked on the ground before starting any construction. Call 8-1-1, go online to **www.call811.com**, or contact your local utility company to schedule utility marking for your project site.

☐ MATERIAL STAGING

Store Redi-Rock blocks in a location close to the proposed wall. Blocks should be kept clean and mud free. Blocks should also be stored in a location which will minimize the amount of handling on the project site.

Store geogrid in a clean, dry location close to the proposed wall. Keep the geogrid covered and avoid exposure to direct sunlight.

Be careful where you stockpile excavation and backfill material. Do not stockpile material over buried utility pipes, cables, or near basement walls which could be damaged by the extra weight.

☐ MATERIAL VERIFICATION

Material planned for use as drainage aggregate between and behind Redi-Rock blocks and structural backfill material proposed for use in the reinforced soil zone of mechanically stabilized earth walls must be inspected and verified to comply with requirements of the construction documents, plans, and specifications.

☐ EQUIPMENT

Make sure you have the proper equipment to handle Redi-Rock blocks and install the wall. Redi-Rock blocks are quite large and heavy. Make sure excavators and other construction equipment are properly sized to handle the blocks safely. **(Figure 1)**

Hand-operated equipment should include, at a minimum: shovels, 2-foot (0.6-meter) level, 4-foot (1.2-meter) level, broom, hammer, tape measure, string, spray paint, laser level, pry or Burke bar, walk-behind vibratory plate compactor (capable of delivering a minimum of 2000 lb (8.9 kN) centrifugal force), and a 16-inch (406-millimeter) concrete cut-off saw. **(Figure 2)**

Personal protective equipment should include, at a minimum: appropriate clothing, steel toe boots with metatarsal protection, eye protection, hard hat, gloves, hearing protection, fall protection rigging, and other items as necessary to ensure a safe working environment.

Figure 1

Figure 2

4. SUBGRADE SOILS

Proper base preparation is a critical element in the construction of your retaining wall. Not only is it important to provide a stable foundation for the wall, but a properly prepared base will greatly increase the speed and efficiency of your wall installation. Proper base preparation starts with the subgrade soils.

Existing soils must be removed to the bottom of the leveling pad elevation for the retaining wall.

The base and back of excavation should expose fresh, undisturbed soil or rock. Remove all organic, unsuitable, and disturbed soils that “fall-in” along the base of the wall or the back of the excavation. Always provide safe excavations in accordance with OSHA requirements.

The subgrade soil (below the leveling pad) should be evaluated by the Engineer or Owner’s Representative to verify that it meets the design requirements and to determine its adequacy to support the retaining wall. Any unsuitable material shall be excavated and replaced as directed by the on-site representative and per the requirements of the contract drawings, plans, and specifications.

Subgrade soils must be compacted to a density as specified in the contract documents, plans, and specifications but not less than 90% maximum density at ± 2% optimum moisture content as determined by a modified proctor test (ASTM D1557). **(Figures 3 and 4)**

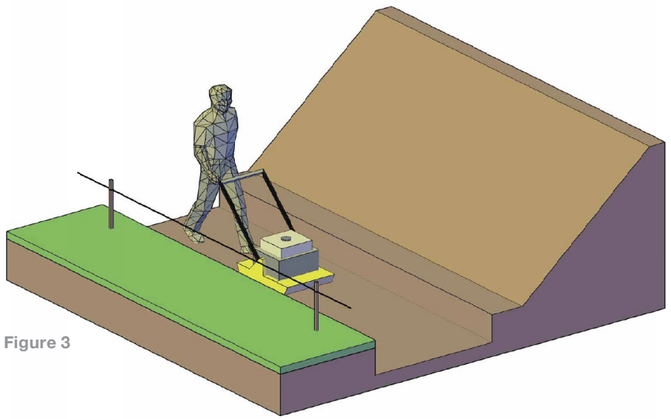


Figure 3

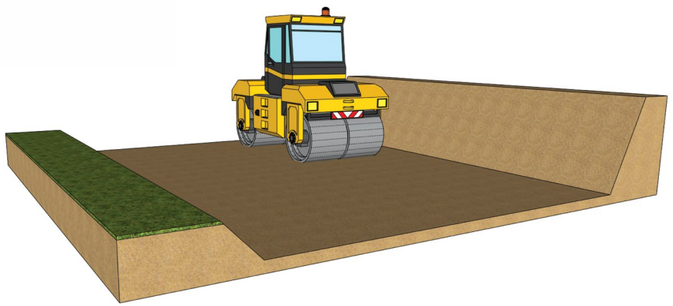


Figure 4

5. LEVELING PAD

Base preparation continues with proper leveling pad construction. Redi-Rock retaining walls can be designed with an open-graded crushed stone, dense-graded crushed stone (GAB), or concrete leveling pad which supports the bottom row of blocks. The choice of which type of leveling pad to use is made by the wall design engineer and depends on several factors including the bearing capacity of the native soil, location of the drain outlet, and conditions at the base of the wall.

Open-graded crushed stone is typically used in cases where the wall drain can outlet to daylight (by gravity) somewhere below the elevation of the bottom of the leveling pad. **(Figure 6A)** The material should be 1-inch (25-millimeter) diameter and smaller stone. A crushed stone meeting the gradation requirements of ASTM No. 57 with no material passing the No. 200 (74 µm) sieve is preferred. The leveling pad thickness shall be as designed by the wall design engineer. A minimum thickness of 6 inches (152 millimeters) or 12 inches (305 millimeters) is common. The leveling pad should extend at least 6 inches (152 millimeter) in front and 12 inches (305 millimeters) behind the bottom block. Make sure to check your construction documents for details.

Dense-graded crushed stone or graded aggregate base (GAB) material is typically used in cases where the wall drain can only outlet to daylight somewhere above the bottom of the leveling pad. **(Figure 6B)** The material should be dense-graded crushed stone with between 8 and 20% “fines” which will pass through a No. 200 (74 µm) sieve. The leveling pad thickness shall be as designed by the wall design engineer. Minimum dimensions are the same as those for an open-graded crushed stone leveling pad.

The leveling pad material should be placed and compacted to provide a uniform, level pad on which to construct the retaining wall. **(Figure 5)** Proper elevation can be established with a laser level or transit. You can also set two 20’ (6 m) long grade (screed) pipes to the desired grade and screed the crushed stone material between the pipes.

Figure 5

Place the stone leveling pad in uniform loose lifts a maximum of 6 inches (152 millimeter) thick. Consolidate the stone with a minimum of three passes with a 24-inch (610-millimeter) wide walk-behind vibrating plate compactor capable of delivering at least 2000 pounds (8.9 kN) of centrifugal force. This should achieve 85% relative density of the stone determined in accordance with ASTM D-4253 and D-4254. In place density of the stone fill should be confirmed using ASTM D-6938. If you don’t achieve a minimum of 85% relative density, place the stone in smaller lifts or apply more compaction effort until you do achieve desired density of the stone.

Unless specifically included in the design calculations, do NOT place a thin layer of sand between the leveling pad and bottom block. This layer will reduce the sliding resistance between the leveling pad and bottom block.

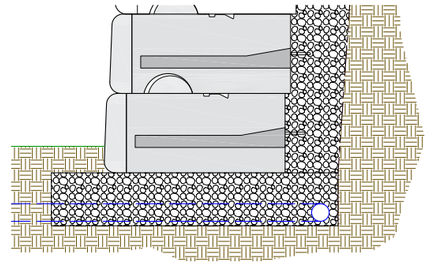
In some cases, the wall design requires the construction of a concrete leveling pad. **(Figures 6C and 6D)** Construct the leveling pad according to the detailed plans for your project.

Some designs require a shear key in the bottom of the footing and/or a lip in front of the Redi-Rock blocks. These items would be shown in the project plans.

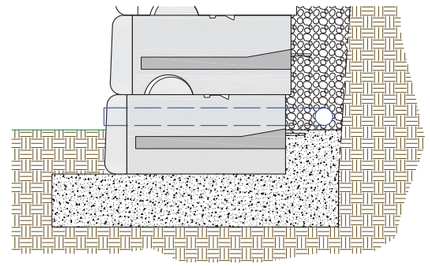
If steel rebar is to be placed in the footing, secure the bars together with wire ties in the pattern shown in the construction documents. Use rebar supports to hold the rebar structure in the proper position in the footing.

Place wood formwork at the front and back of the concrete leveling pad or footing. The top of the formwork should be placed at the elevation of the top of the concrete footing so you can screed the top smooth in preparation for block placement. It is important that the top surface be smooth and level for full contact of the retaining wall blocks. Place concrete as specified in the wall design. Once the concrete has been allowed to cure to the minimum specified strength, place the bottom blocks and continue construction of the retaining wall.

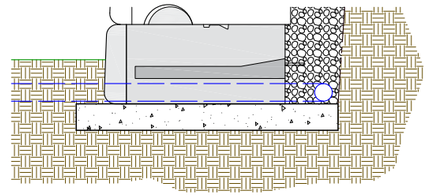
Figure 6



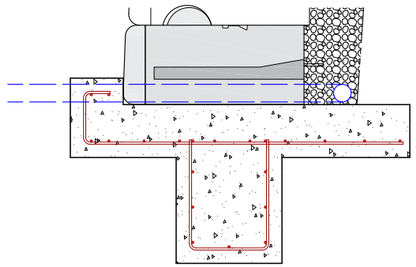
A. Open Graded Stone Leveling Pad



B. Dense Graded Stone Leveling Pad



C. Lean Concrete Leveling Pad



D. Reinforced Concrete Leveling Pad

6. SETTING THE BOTTOM ROW OF WALL BLOCKS

Redi-Rock blocks are typically delivered to the construction site using a flatbed trailer or boom truck. **(Figure 7)** Rubber tired backhoes, loaders, skid steers, or excavators are used to set the retaining wall blocks. **(Figure 8)** Make sure to use the proper sized equipment to handle the large blocks. All lifting chains, rigging, or slings must be OSHA compliant and safety rated for proper working loads.

Properly mark the location of the retaining wall. A string line or offset stakes are typically used to establish horizontal and vertical alignment. If offset stakes are used, the stakes should be placed at least 5 feet (1.5 meters) but no more than 10 feet (3 meters) in front of the face of the retaining wall. A stake should be provided at every elevation change and at a maximum of 50 feet (15 meters) apart.

Wall construction should start at a fixed point such as a building wall, 90° corner, or at the lowest elevation of the wall.

Place the blocks on the prepared leveling pad. Blocks shall be placed in full contact with the leveling pad and other immediately adjacent block units. **(Figure 9)** Block alignment should be established by lining up the "form line" where the face texture meets the steel form finished area at the top of the block, approximately 5 inches (127 millimeters) back from the front face. **(Figure 10)**

Check all blocks for level and alignment as they are placed. Small adjustments to the block location can be made with a large pry or Burke bar. Proper installation of the bottom block course is critical to maintaining the proper installation of all subsequent block courses within acceptable construction tolerance. It also makes installation of the upper rows of blocks much easier and more efficient.

Place and compact backfill in front of the bottom block course prior to placement of subsequent block courses or backfill. This will keep the blocks in place as drainage aggregate and backfill are placed and compacted.

Figure 7

Figure 8

Place an 18 inch x 12 inch (457 millimeter x 305 millimeter) piece of non-woven geotextile fabric in the vertical joint between the blocks to prevent the drainage aggregate and backfill material from migrating through the vertical joints between blocks. **(Figure 11)**

Place washed drainstone or open-graded crushed stone backfill between blocks and at least 12 inch (305 millimeter) behind the wall. A stone meeting the gradation requirements of ASTM No. 57 with no material passing the No. 200 (74 µm) sieve is preferred. Place the stone in uniform loose lifts a maximum of 6 inches (157 millimeter) thick. Consolidate the stone with a minimum of three passes with a 24-inch (610 millimeter) wide, walk-behind, vibrating plate compactor capable of delivering at least 2000 lb (8.9 kN) of centrifugal force. **(Figure 12)** This should achieve 85% relative density of the stone determined in accordance with ASTM D-4253 and D-4254. In place density of the stone fill should be confirmed using ASTM D-6938. If you don't achieve a minimum of 85% relative density, place the stone in smaller lifts or apply more compaction effort until you do achieve desired density of the stone.

Place non-woven geotextile fabric between the drainstone and the remaining backfill material if specified.

Backfill behind the drainage aggregate with material as specified in the project construction documents. Place the lifts as specified, but not to exceed 9 inches (229 millimeter) maximum. Granular backfill shall be compacted to a minimum of 90% maximum density at ± 2% optimum moisture content as determined by a modified proctor test (ASTM D1557). Use proper equipment to insure complete compaction of the backfill material. It may be necessary to wet or dry the backfill material, place the material in smaller lifts, and/or apply more compaction effort to reach 90% maximum density. Do not use any organic, topsoil, frozen, soft, wet, or loose soils when backfilling the wall.

Re-check all units for level and alignment and sweep the top of each course of blocks clean before starting construction of the next course.

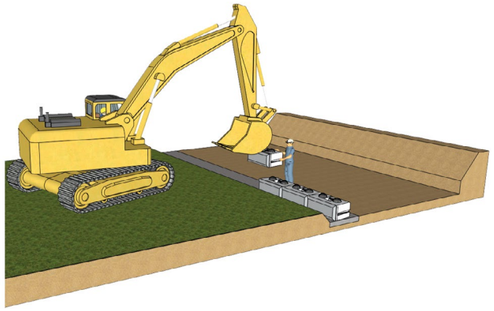


Figure 9

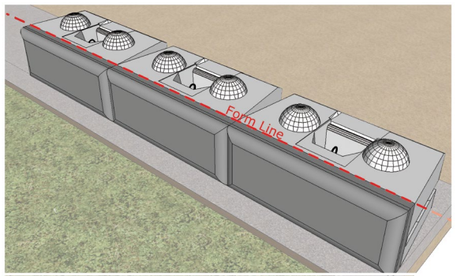


Figure 10

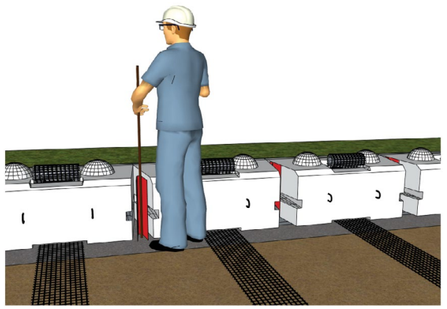


Figure 11

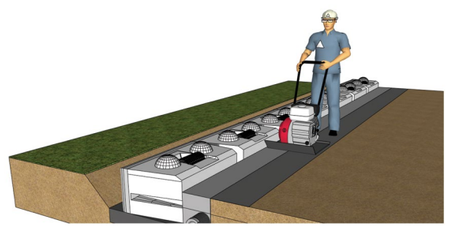


Figure 12

7. INSTALLING THE WALL DRAIN

A drain is placed behind the Redi-Rock wall blocks at the lowest elevation where the pipe can safely outlet to daylight. Drainage aggregate should be placed to the bottom of the drain as shown in the construction documents. A 4-inch (102 millimeter) perforated sock drain is commonly used for the drain pipe. Often the drain is encapsulated with drainage aggregate and wrapped with a non-woven geotextile fabric. The drain should run the entire length of the wall and needs to have proper outlets on the ends and at regularly spaced points along the wall. Solid pipe should be used for weep hole outlets through the face or under the retaining wall. **(Figure 13)**

Care needs to be taken during installation to avoid crushing or damaging the drain pipe or outlets.

8. SETTING UPPER ROWS OF WALL BLOCKS

Once the backfill is fully placed and compacted for the block course below, place the next row of blocks in a running bond configuration with the vertical joint of the lower block units centered under the mid-point of the block units above. If needed, a half block can be used at the end of every other row to maintain a running bond. **(Figure 14)**

Push the Redi-Rock blocks forward until the groove on the bottom of the block comes in full contact with the knobs on the blocks below. Adjacent blocks shall be placed with their front edges tightly abutted together.

Place non-woven geotextile fabric in the vertical joint between the blocks, and place and compact the drainage aggregate and backfill material the same way you did for the bottom row.

Never install more than one course of blocks without placing and compacting drainage aggregate and backfill to the full height of the block units. Placing multiple courses of blocks without backfill will prevent the proper placement and consolidation of the drainage aggregate between the blocks.

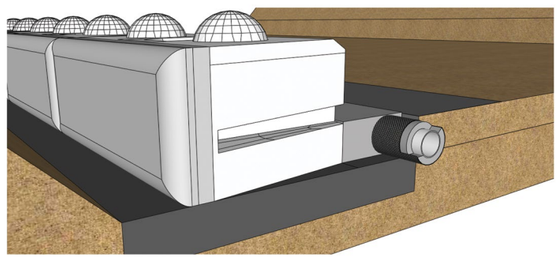


Figure 13

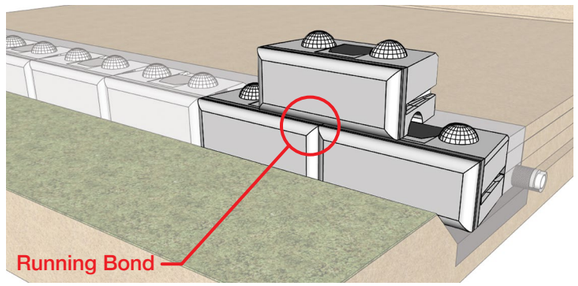


Figure 14

9. INSTALLING GEOGRID FOR MECHANICALLY STABILIZED EARTH WALLS

Redi-Rock blocks are designed to allow you to build relatively tall non-reinforced (or gravity) walls which use the weight of the blocks to provide stability. However, for some projects you may need to build even taller walls. In these cases, mechanically stabilized earth (MSE) retaining walls can be built with the Redi-Rock Positive Connection (PC) System.

The geogrid used in Redi-Rock PC System walls are 12-inch (305-millimeter) wide strips of PVC coated polyester geogrid that wrap through a vertical core slot cast into the block and extend full length into the reinforced soil zone on both the top and bottom of the block.

> **It is critical that you only use factory cut strips of Mirafi geogrid that are certified by TenCate Mirafi for width and strength. Field cutting strips of geogrid from larger rolls can significantly degrade the capacity of the wall system and is not allowed. Geogrid strips are only available through a Redi-Rock Manufacturer. (Figure 15)**

Verify that you have the correct geogrid material and then cut the individual strips to the required length. The distance a geogrid strip must extend into the reinforced soil zone (design length) is measured from the back of the block to the end of the geogrid. Since the geogrid wraps through the block, the actual cut length of a given geogrid strip is two (2) times the design length plus enough additional geogrid to wrap though the block. For the Redi-Rock 28-inch (710-millimeter) PC blocks, the cut length is two (2) times the design length plus 3 feet (0.9 meters).

Figure 15

Inspect the Redi-Rock PC blocks for any concrete flashing or sharp edges in the slot and groove through the block. Remove any flashing and grind smooth any sharp edges which could damage the geogrid reinforcement.

Place the geogrid strip in the vertical core slot from the bottom of the block and pull approximately half of the length of the strip up through the core slot. Measure from the back of the block unit to the required design length and pin the bottom leg of the geogrid strip with staples, stakes, or other appropriate methods. Pull the geogrid strip tight to remove any slack, wrinkles, or folds. Secure the geogrid firmly in place by putting a pin through the geogrid and the steel lifting insert which is located in the recessed area on the top of the PC block **(Figure 16)** or placing drainage aggregate in the vertical core slot.

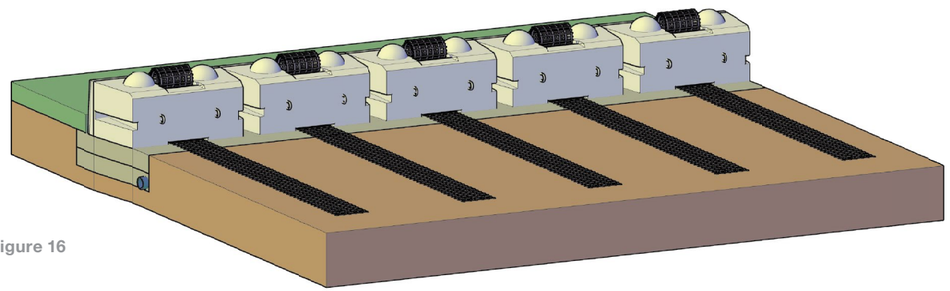


Figure 16

Place drainage aggregate between and behind the blocks. **(Figure 17)** Place the stone in uniform loose lifts as required in the project plans and specifications. Consolidate the stone between the blocks by hand tamping. Make sure to tamp stone into the ends of the groove on the bottom of the Redi-Rock PC blocks. Consolidate the stone behind the blocks with a minimum of three passes with a 24-inch (610-millimeter) wide walk-behind vibrating plate compactor capable of delivering at least 2000 lb (8.9 kN) of centrifugal force. Provide further compaction if needed to meet the density specified in the contract documents, but not less than 85% relative density of the stone determined in accordance with ASTM D-4253 and D-4254.

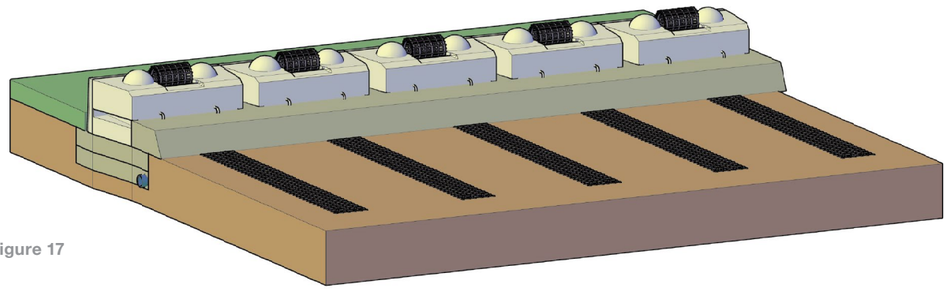


Figure 17

Place a strip of non-woven geotextile fabric between the drainage aggregate and the reinforced soil zone if specified.

Place the reinforced soil zone material in uniform loose lifts as required in the project plans and specifications. Reinforced soil zone material must be compacted to a density as specified in the contract documents, plans, and specifications but not less than 90% maximum density as determined by a modified proctor test (ASTM D1557).

Begin compaction at the back of the wall blocks and proceed to the embedded end of the geogrid strip using care to maintain the reinforcement strip in a level, taut condition oriented perpendicular to the back of the block unit to which it is attached.

Use hand operated compaction equipment within 3 feet (1 meter) of the back of the PC blocks. Heavier equipment can be used beyond 3 feet (1 meter) away from the PC blocks. Tracked construction equipment must not be operated directly on the geogrid strip reinforcement. A minimum fill thickness of 6 inches (150 millimeter) is required for the operation of tracked vehicles over the geogrid strips. Turning of tracked vehicles should be kept to a minimum to prevent displacement of the fill and the geogrid strips. Rubber-tired vehicles may pass over the geogrid strips at a slow speed of less than 5 mph (8 km/hr). Sudden breaking and sharp turning should be avoided.

After placing and properly compacting backfill to the elevation of the geogrid strip at the top of the block, extend the top leg of the geogrid strip to the design length required. Pull the geogrid strip tight to remove any slack, wrinkles, or folds. **(Figure 18)** Pin the top leg of the geogrid strip with staples, stakes, or other appropriate methods to hold it in place and keep the geogrid strip taut.

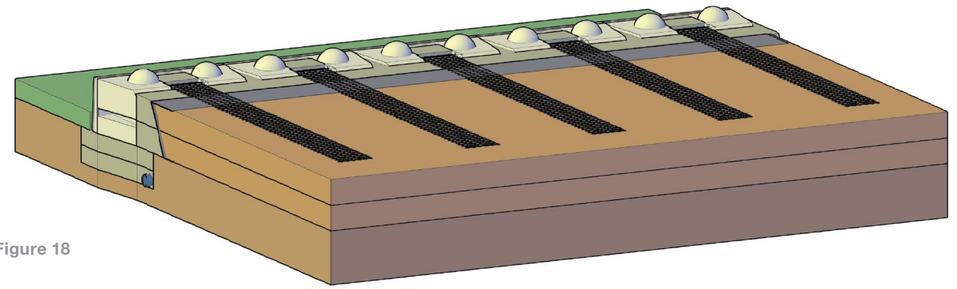


Figure 18

Fill the center slot in the PC blocks with drainage aggregate. Be careful to keep the grid flat against the back of the slot in the PC block and prevent any stone from lodging between the geogrid and the concrete block. Fill the vertical core slot completely with drainage aggregate. Consolidate the drainage aggregate by hand tamping. Use a broom to sweep clean the top of the blocks. Do not operate a walk behind vibratory plate compactor on top of the Redi-Rock PC blocks.

Place retained soil immediately between the end of the reinforced soil zone (identified as the embedded end of the geogrid reinforcement strips) and the back of the excavation. Compact retained soil to a density as specified in the contract documents, plans, and specifications but not less than 90% maximum density at ± 2% optimum moisture content as determined by a modified proctor test (ASTM D1557). Maximum differential elevation between the reinforced fill and the retained soil fill should never exceed 18 inches (457 millimeters).

Continue construction in a similar fashion to the top of the wall. **(Figure 19)**

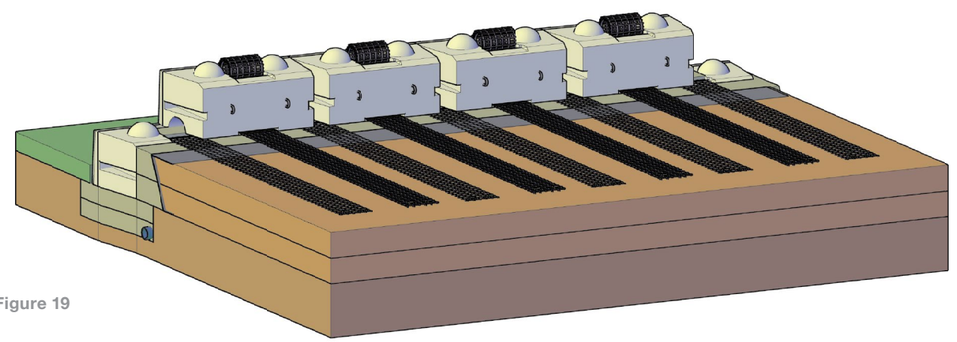


Figure 19

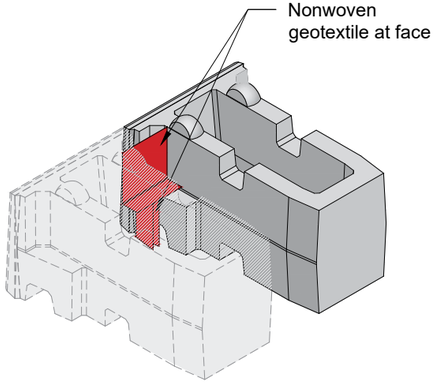
10. XL HOLLOW-CORE RETAINING BLOCKS

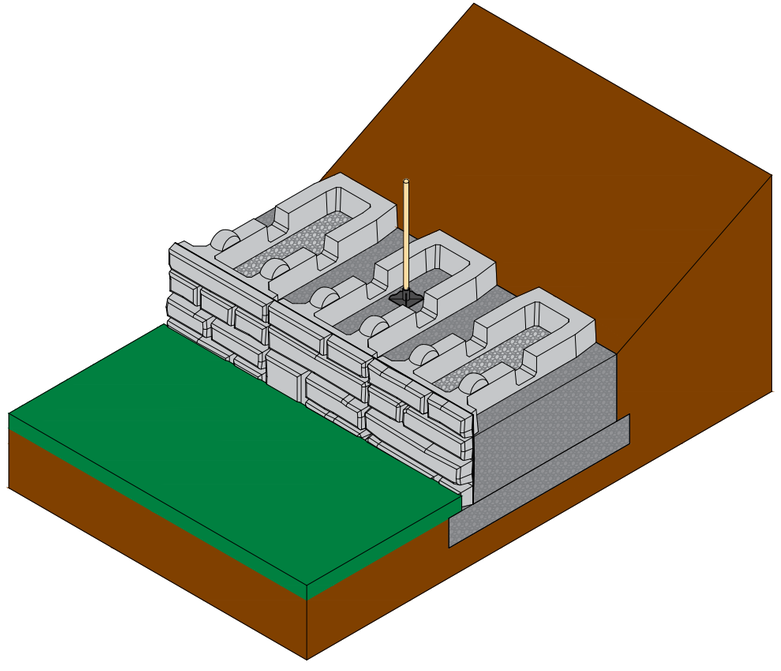
The greater width of XL blocks allows gravity walls to be built to greater height, while the greater individual block heights means that each block creates more area of wall face. XL block retaining wall installation generally follows the procedures of other Redi-Rock products, with a few differences.

Following the general procedures of sections 1 to 9, prepare the subgrade soils and place the leveling pad. The required leveling pad thickness will depend on the design by the wall design engineer, but will generally be a minimum of 12 inches (305 mm) thick.

Use appropriately-rated rigging fastened to the three lift hooks (one in the middle and two in the back of the blocks) and suitable heavy equipment to lift blocks into place. Place the first row of blocks to the correct line and grade. Just as with other Redi-Rock products, extra attention to ensure the first row of blocks is level and installed to the correct line and grade will save effort later as the installation proceeds.

Place two 18-inch (457 mm) by 18-inch (457 mm) pieces of non-woven geotextile fabric in each vertical joint between blocks – one on the upper half of the joint and one in the lower, wedge-shaped portion of the joint - to prevent the drainage aggregate and backfill material from migrating through the vertical joints at the blocks' face. Place washed drainstone or open-graded crushed stone backfill into the hollow cores of the blocks and between blocks in lifts of no more than 9 inches (230 mm) deep. Compact each lift by tamping until no further consolidation occurs with a soil tamper or other similar method. Strike off the top and sweep the upper surface of the blocks so the next row will sit cleanly on the lower row.





Due to the high percentage of open-graded stone within and between blocks, a drainage course behind the blocks is not required, but may be desirable to ease compaction of backfill and improve drainage. Place a layer of nonwoven geotextile fabric between the back of blocks (or drainstone layer, if used) and retained backfill.

Place and compact backfill as described above and repeat as necessary to reach the required height. Finish the top of wall with one or more rows of 18-inch (457 mm) high retaining blocks or freestanding blocks.

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11. SPECIAL FEATURES

Some walls require special features such as curves, corners, top of wall details, details for elevated groundwater applications, and other details. Refer to the construction documents, plans, and specifications for details to construct these features. Additional general reference construction details are available on the Redi-Rock website, **redi-rock.com**.

Figure 21

Figure 22

Figure 23

12. IMPORTANT NOTES

Best practice dictates that wall construction should continue without interruption or delays. This will help expedite construction and minimize the time the excavation is open.

The construction site should be graded and maintained to direct surface water runoff away from the retaining wall throughout the entire construction process.

Do not exceed the allowable construction tolerances specified in the contract documents, plans, and specifications. At no time should tolerances at the wall face exceed 1° vertically and 1” in 10’ (1:120) horizontally.

Immediately report the following site conditions, if encountered, to the Engineer or Owner’s representative to determine the corrective action needed:

- Any observed groundwater seepage.
- Surface water run-off directed toward the retaining wall during construction.
- Erosion or scour of material near the wall.
- Ponded water near the wall.
- Wet, soft, or easily compressible soils in the foundation zone.
- Existing rock that differs in location from that shown on the project plans or rock located above the elevation of the bottom of the leveling pad.
- Existing or proposed toe or crest slopes that differ from typical cross-sections shown in the project plans.
- Any other items not specifically mentioned which raise questions or cause concerns during wall construction.

Immediately implement any corrective action before resuming wall construction.

13. FREESTANDING WALLS

Redi-Rock freestanding wall blocks have facing texture on two or three sides. They are used in applications where two or three sides of the wall are visible. Freestanding blocks can be installed as “stand alone” walls, such as perimeter walls or fences. They can also be designed and installed as the finishing top courses on a Redi-Rock retaining wall.

Freestanding wall installation is similar to that for Redi-Rock retaining walls. The main exception is that there is typically no backfill material behind the freestanding walls. Even though there is no backfill acting on the walls, freestanding walls need to be properly engineered. They require adequate stability at the base of the wall and they need to resist any applied forces such as wind loads or forces from railings or fences.

If you are building a “stand alone” freestanding wall, prepare the subgrade soils and leveling pad as described previously. Place bottom blocks on the leveling pad. A 6 inch (152 millimeter) minimum bury on the bottom block is typical. Extra bury may be required for some projects. Middle and top blocks are placed directly on top of the bottom blocks with no batter.

If you are building a freestanding wall on the top of a Redi-Rock retaining wall, end the last row of retaining wall blocks with a middle block. The size of the knob on top of the last row of retaining wall blocks will establish the setback for the first row of freestanding blocks. Retaining blocks with a 10-inch (254-millimeter) diameter knob will produce a 2 7/8 inch (73 millimeter) setback between the retaining block and the first freestanding block. If the retaining blocks have a 7 ½ inch (190 millimeter) diameter knob, the setback between the retaining block and the first freestanding block will be 1 5/8 inches (41 millimeters). Be sure to contact your local Redi-Rock manufacturer to determine availability of blocks with different knob sizes.

Begin and end freestanding walls with full or half Corner blocks.

Freestanding walls are installed plumb with no batter.

Figure 24

Variable radius freestanding blocks with a 4 inch x 12 inch (102 millimeter x 305 millimeter) pocket in one or two ends of the block are used to make curved walls. Field cut the relatively thin face texture on the ends of the variable radius blocks as needed to make the desired radius for your wall. **(Figure 24)**

Colored foam “Backer Rod” can be used to fill any small gaps which may occur between the blocks when installing walls. Backer rods can be purchased from concrete supply centers. Call your local Redi-Rock manufacturer for help locating foam backer rods for your project.

14. MAGIC BLOCK HOLLOW-CORE FREESTANDING WALLS

Redi-Rock Magic Block freestanding hollow-core units are stacked, similar to other Redi-Rock freestanding blocks, but then filled with concrete. Freestanding Hollow-Core Blocks work well for freestanding barriers, and can also be utilized for cantilever retaining walls.

CANTILEVERED WALLS

For many applications, the Freestanding Hollow-Core Blocks will be supported by a reinforced concrete footing. Prior to placing the footing, layout the wall to determine the locations of the open cores in the staggered rows of hollow-core units. This will help determine where rebar should be placed in the footing. When determining vertical rebar placement, consider the equipment that will be used to set the block to help avoid conflicts. Number and size of rebar will depend upon the engineer’s structural design.

Construct the footing on a competent subgrade per the design drawings. Once the footing has cured, use a stringline to mark the alignment of the blocks (usually the inside of the block). Begin setting blocks. A scissors-type clamp works well. **(Figure 25)** Alternatively, straps looped around the interior ribs can be used, as well.

Figure 25

Corners can be constructed in the wall using hollow-core corner blocks. These blocks have texture on three sides. For a tight fit between blocks, the texture on the corner block can be trimmed by 2 or 3 inches where it abuts the adjacent block. If the design requires continuous rebar, cut a section out of the side of the corner block aligned with the hollow core of the adjacent block. **(Figure 26)**

Place horizontal rebar in the blocks, supported in the grooves on the interior structural ribs. Place the vertical rebar, lapping and tying, as required.

Stack the next row of block, making sure to carefully align the blocks and staggering the joints to create a running bond. We recommend stacking no more than three courses of block without filling the core.

Prior to infilling the wall, we suggest grouting the joints between blocks with non-shrink standard grout. This helps prevent leakage during infilling, and provides an aesthetic element.

Infill the hollow core of the wall with ready-mix concrete meeting the requirements of the design. Place the concrete carefully to prevent misalignment of the rebar. While filling, use an internal concrete vibrator to ensure consolidation and eliminate voids.

Figure 26

COPING

Magic Block Freestanding Hollow-Core Blocks can be placed on Redi-Rock PC-series walls to create a free-standing coping. The connection uses a No. 3 rebar hook to tie the coping to the upper PC blocks.

Install a No. 3 rebar hook through the lifting hook in each PC block and let the hook lay on the shear knob.

Install PC geogrid strips, if required. Fill the PC core with stone to the recess area. Place plastic sheeting over the geogrid exposed in the PC core.

Set the Freestanding Hollow-Core Blocks in place on the PC blocks.

Install the horizontal and vertical reinforcing steel, as required by the design. Pull the rebar hooks up into the Freestanding Hollow-Core Blocks core and engage with the horizontal rebar. Fill the hollow cores with concrete. **(Figures 27 & 28)**

Figure 27

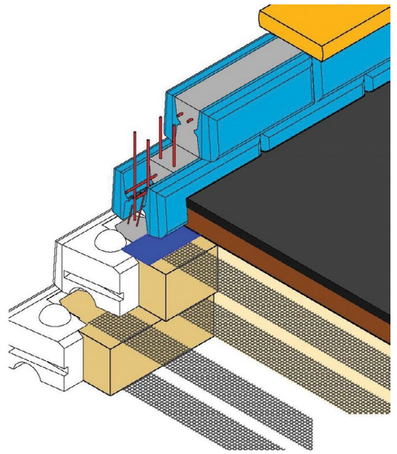


Figure 28

WATER CONTROL APPLICATIONS

A few additional details can be incorporated into Freestanding Hollow-Core walls to improve their water-tightness for flood control and other water-related applications. **(Figure 29)**

Prior to constructing the footing, perform any subgrade preparation, soil improvements, and/or drainage installation as required by the design.

Install an appropriate waterstop at the joint between the footing and the bottom of the wall, following the waterstop manufacturer's recommendations.

When using a ribbed center bulb strip, install it prior to pouring concrete for the footing such that it will be half embedded in the footing. Commonly, it will require attaching to the footing rebar with wire ties.

A bentonite/butyl rubber expandable waterstop can be installed on top of the footing prior to installing the first row of blocks. Be sure to protect the strip from damage and keep it clean.

A keyway can be cast into the footing if required by the design.

Avoid block-to-block joints where structural ribs from adjacent blocks will be in contact, as this will result in a joint with little, if any, cast-in-place concrete available to resist water flow. If necessary, remove one of the offending ribs with a concrete saw.

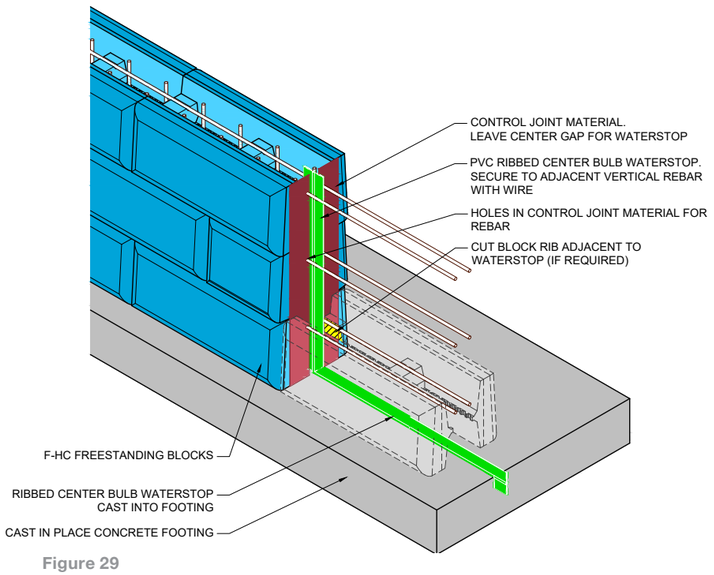


Figure 29

When placing concrete, extra care should be taken to fully consolidate the concrete to eliminate voids which could become conduits for water. Integral crystalline waterproofing admixtures are available that can reduce permeability and seal small cracks. Additional measures, such as sealing exposed joints with non-shrink grout and/or mastic and casting a slab against the wall can also be used to reduce water penetration. Foundation waterproofing experts should be consulted to select and assist with the installation of any performance improvement measures.

15. CAP INSTALLATION

Cap or step blocks are commonly used on top of freestanding walls to provide a finished look. **(Figure 30)**

Mark the center of the freestanding blocks to monitor the correct running bond spacing.

Secure the cap with construction adhesive, polyurethane sealant, or mortar. If construction adhesive is used, it should meet the requirements of ASTM D3498 and C557 and HUD/FHA Use of Materials Bulletin #60. Two examples are Titebond Heavy Duty Construction Adhesive by Franklin International or PL Premium Construction Adhesive. If polyurethane sealant is used, it should be one-component, highly-flexible, non-priming, gun-grade, high-performance elastomeric polyurethane sealant with movement of ± 25% per ASTM C719, tensile strength greater than 200 psi (1.4 MPa) per ASTM D412, and adhesion to peel on concrete greater than 20 PLI per ASTM C794.

Adhesive or sealants should be applied in 1.5 inch (38 millimeter) diameter round "Hershey Kiss" shaped dollops located in two rows at the top of the freestanding blocks at 8 inches (203 millimeter) on center.

Caps can be cut as needed for proper alignment. If desired, grout the joints between cap blocks after installation with a non-shrink grout.

Figure 30

16. FORCE PROTECTION WALLS

Install a threaded termination end on the end of the cable. Electroline M Series terminations manufactured by *Esmet, Inc.* work well.

Thread cable with a termination end through all the blocks. It is important that the cable is placed in each course of blocks prior to placing the next course.

Pull the cable through the block on the far end of the wall until approximately 2 inches (51 millimeters) of threads protrude beyond the end of the blocks. The exposed threads will provide room to place for a 5/8 inch x 6 inch x 9 inch (16 millimeter x 152 millimeter x 229 millimeter) steel plate over the exposed threads and start the nut.

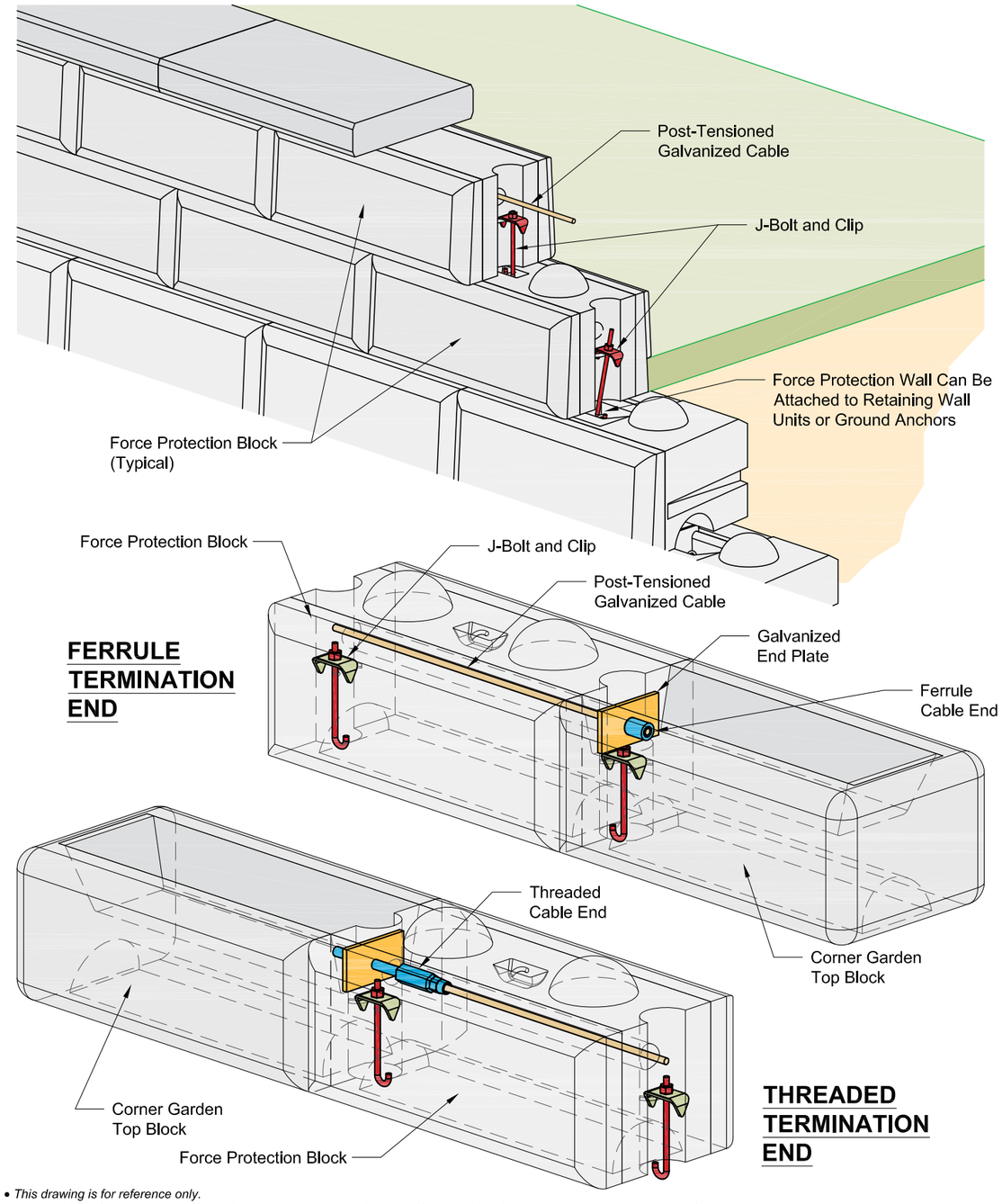
Mark and cut the cable at the starting end of the wall so that 4 inches (102 millimeter) of cable protrudes beyond the block, providing room a 5/8 inch x 6 inch x 9 inch (16 millimeter x 152 millimeter x 229 millimeter) steel plate and ferrule termination fitting.

After the cable has been cut, slide the entire cable several feet (meters) towards the ferrule end so that you will have room to work. Install a steel plate and ferrule termination end on the cable.

Pull the cable snug so that the ferrule is against the steel plate. There will be 2 inches (51 millimeters) of thread exposed at the far end of the wall which has the termination end on the cable.

Place the steel plate over the threads and start the nut. The nut can be tightened to the desired tension.

Force Protection Coping With J-Bolts and Post-Tensioned Cable



- *This drawing is for reference only.*
- ***Final designs for construction must be prepared by a registered Professional Engineer** using the actual conditions of the proposed site.*
- ***Final wall design must address both internal and external drainage and shall be evaluated by the Professional Engineer who is responsible for the wall design.***

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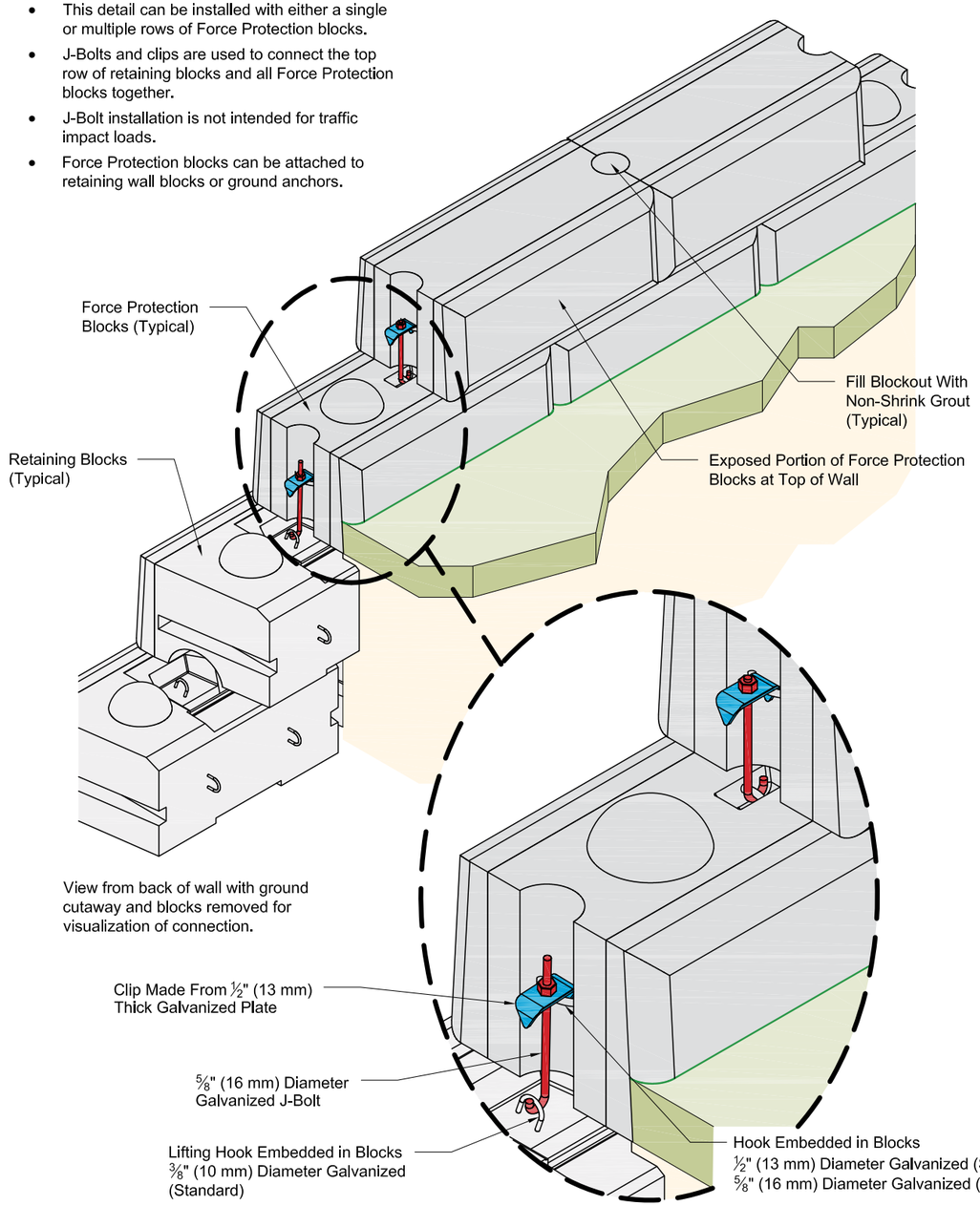
Force Protection Coping With J-Bolts

- This detail can be installed with either a single or multiple rows of Force Protection blocks.
- J-Bolts and clips are used to connect the top row of retaining blocks and all Force Protection blocks together.
- J-Bolt installation is not intended for traffic impact loads.
- Force Protection blocks can be attached to retaining wall blocks or ground anchors.



- *This drawing is for reference only.*
- ***Final designs for construction must be prepared by a registered Professional Engineer** using the actual conditions of the proposed site.*
- ***Final wall design must address both internal and external drainage and shall be evaluated by the Professional Engineer who is responsible for the wall design.***

J-BOLT INSTALLATION

J-Bolts can be used to secure force protection walls to the top row of retaining wall blocks (when used on the top of a Redi-Rock wall) or to concrete anchors set in the ground (for a stand alone wall).

Set force protection blocks with the ends centered on ground anchors or the center of Redi-Rock middle retaining wall blocks immediately below.

Place a clip between blocks in hooks provided in the middle of the block on each end.

Place a J-bolt through center of the clip, thread a nut on the J-bolt, and tighten.

Repeat for all remaining courses of force protection blocks.

17. REDI-ROCK COLUMNS

Redi-Rock column blocks are available to complement Redi-Rock walls. Columns can be installed by themselves or with fences or gates.

Column blocks can be placed on properly prepared aggregate or concrete leveling pads or directly on Redi-Rock retaining wall blocks, depending on the specific design for your project.

Column blocks can be manufactured with pockets for concrete or split wood fence rails.

Concrete adhesive or polyurethane sealant can be used between stacked column blocks.

Install a cap on the top of a column. Adjust the cap position until all sides are equidistant and square to the column. Secure the column cap with construction adhesive or polyurethane sealant.

Special inserts are available for mounting gates or similar features to Redi-Rock columns.

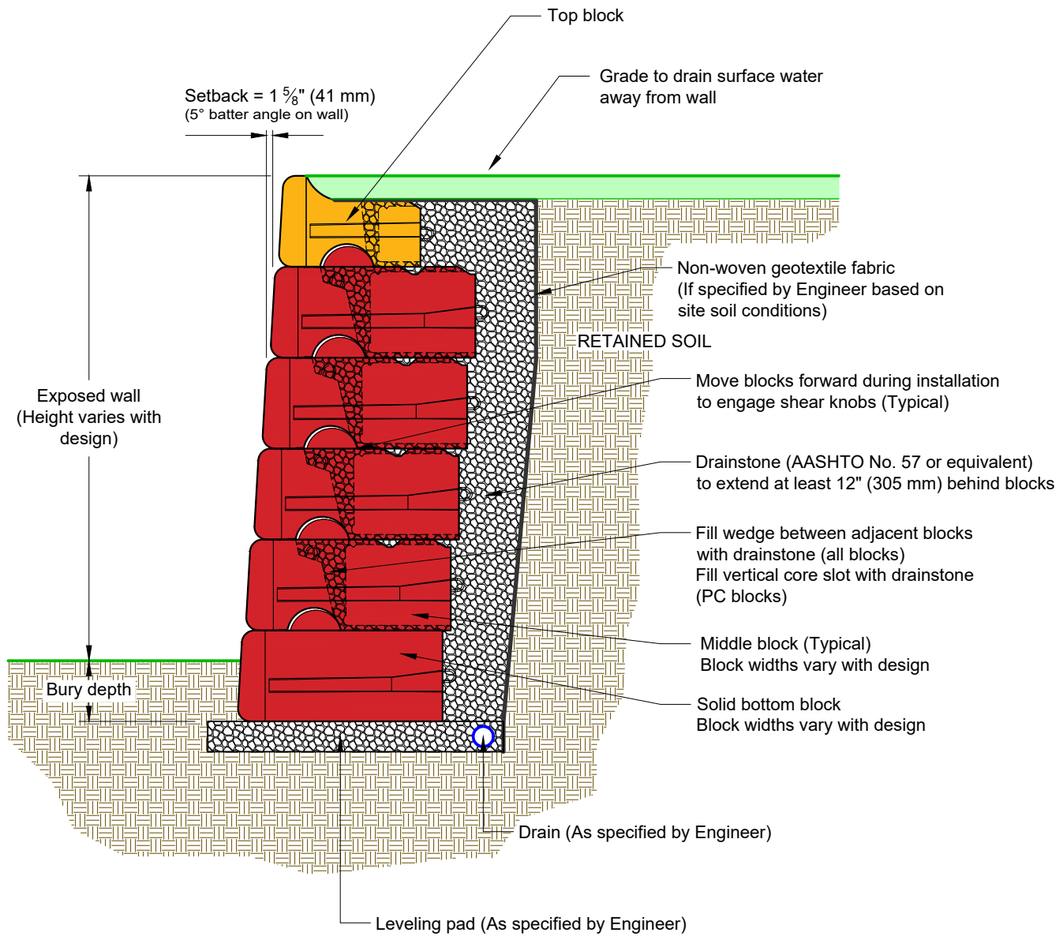
Column blocks are available with 4 inch (102 millimeter) or tapered 8 inch (203 millimeter) diameter cores which can be filled with stone or concrete and steel rebar reinforcement.

A conduit can be left through the core if needed for lighting or other features.

CONSTRUCTION DETAILS

NOTES

Typical Gravity Wall Section



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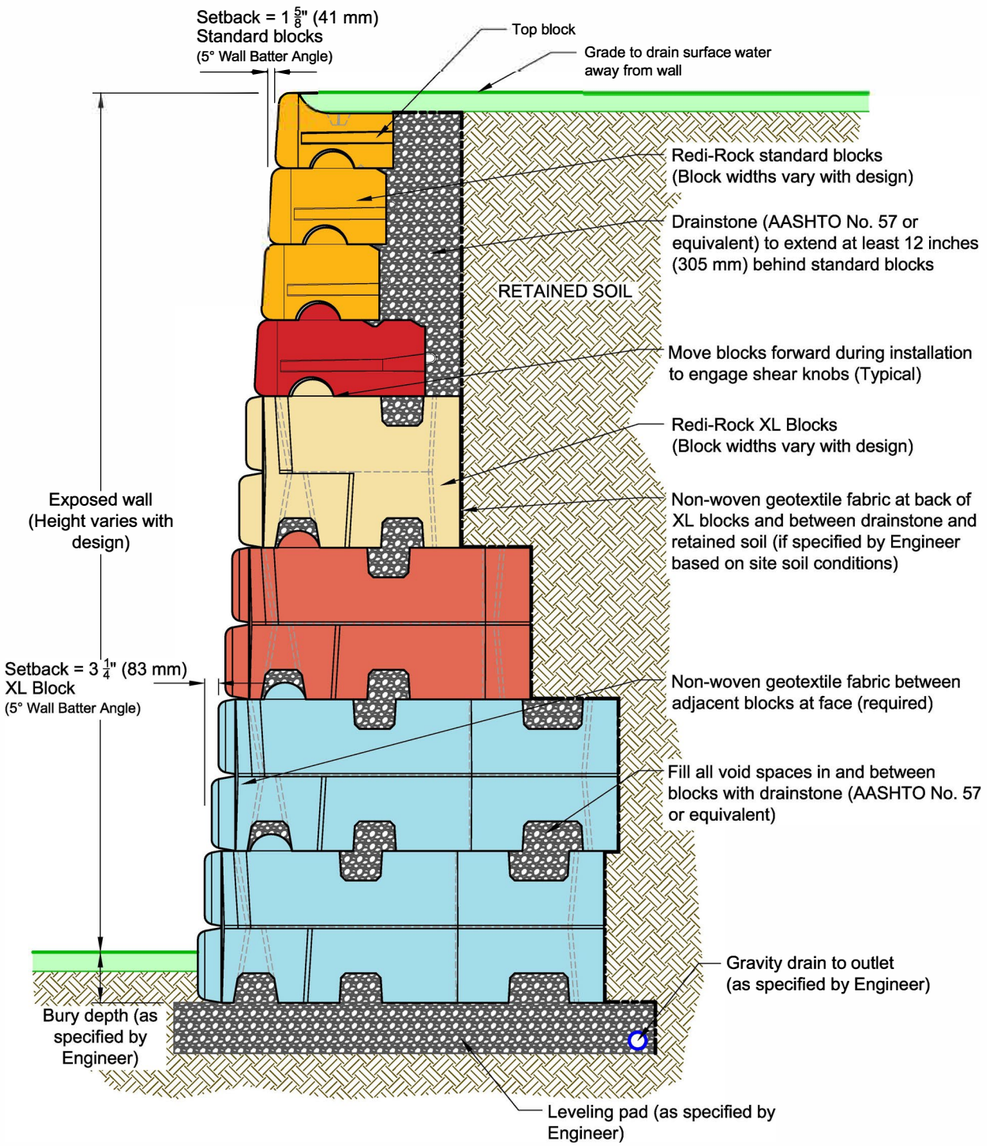
Typical XL Gravity Wall Section



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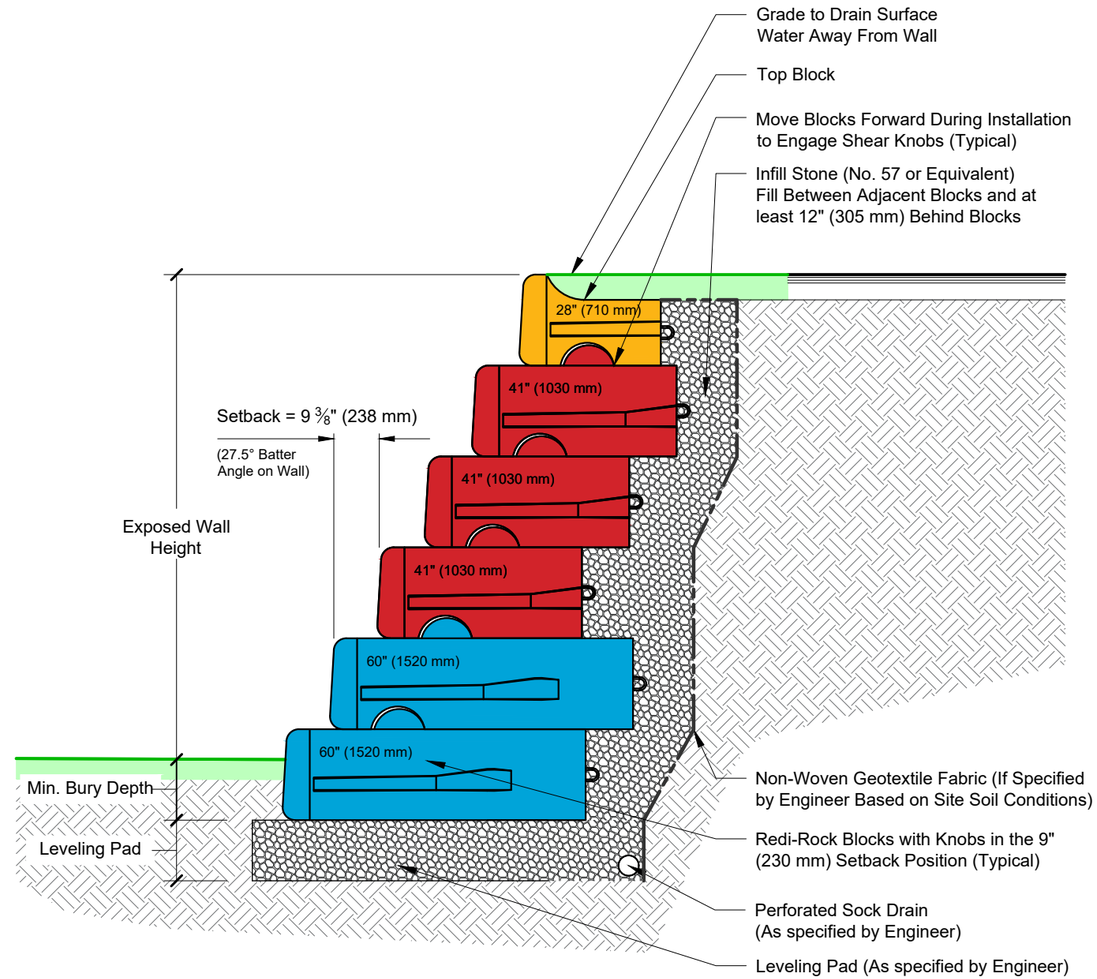
Large Batter Wall Section



This drawing is for reference only. Determination of the suitability and/or manner of use of any details contained in this document is the sole responsibility of the design engineer of record. Final project designs, including all construction details, shall be prepared by a licensed professional engineer using the actual conditions of the proposed site. Final wall design must address both internal and external drainage and all modes of wall stability.

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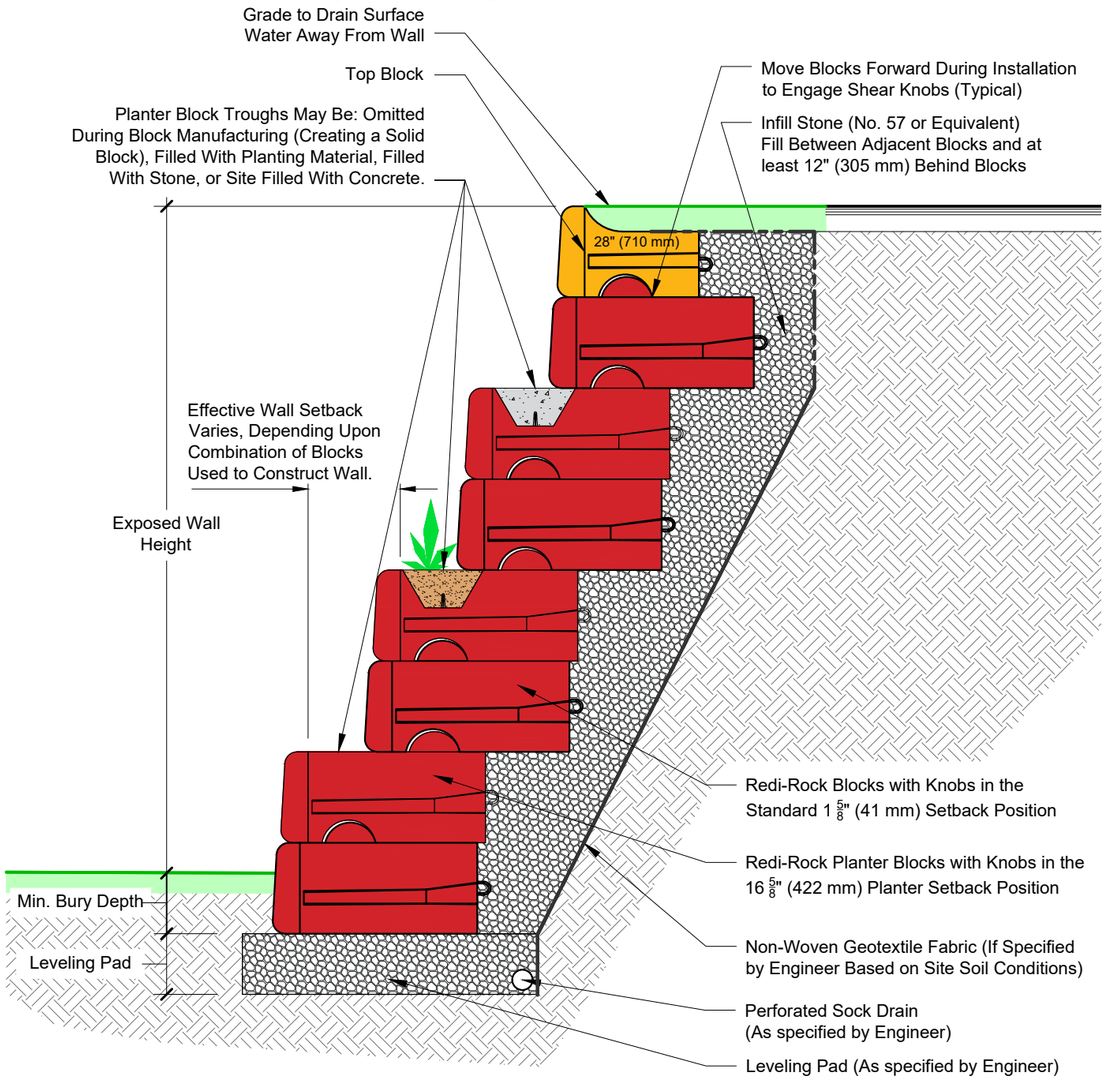
Alternating Planter & Standard Batter Wall Section

The Redi-Rock retaining blocks are available with multiple shear knob size and location options, to permit wall batter design flexibility. This detail depicts alternating 16 5/8" (422 mm) Planter and 1 5/8" (41 mm) Standard setback blocks, however designs are possible using more than one Standard setback block between Planter blocks. The regular repetition of combinations of different setback blocks within a wall profile can have structural and aesthetic significance. Abrupt changes in wall batter that carry over multiple blocks are not recommended.



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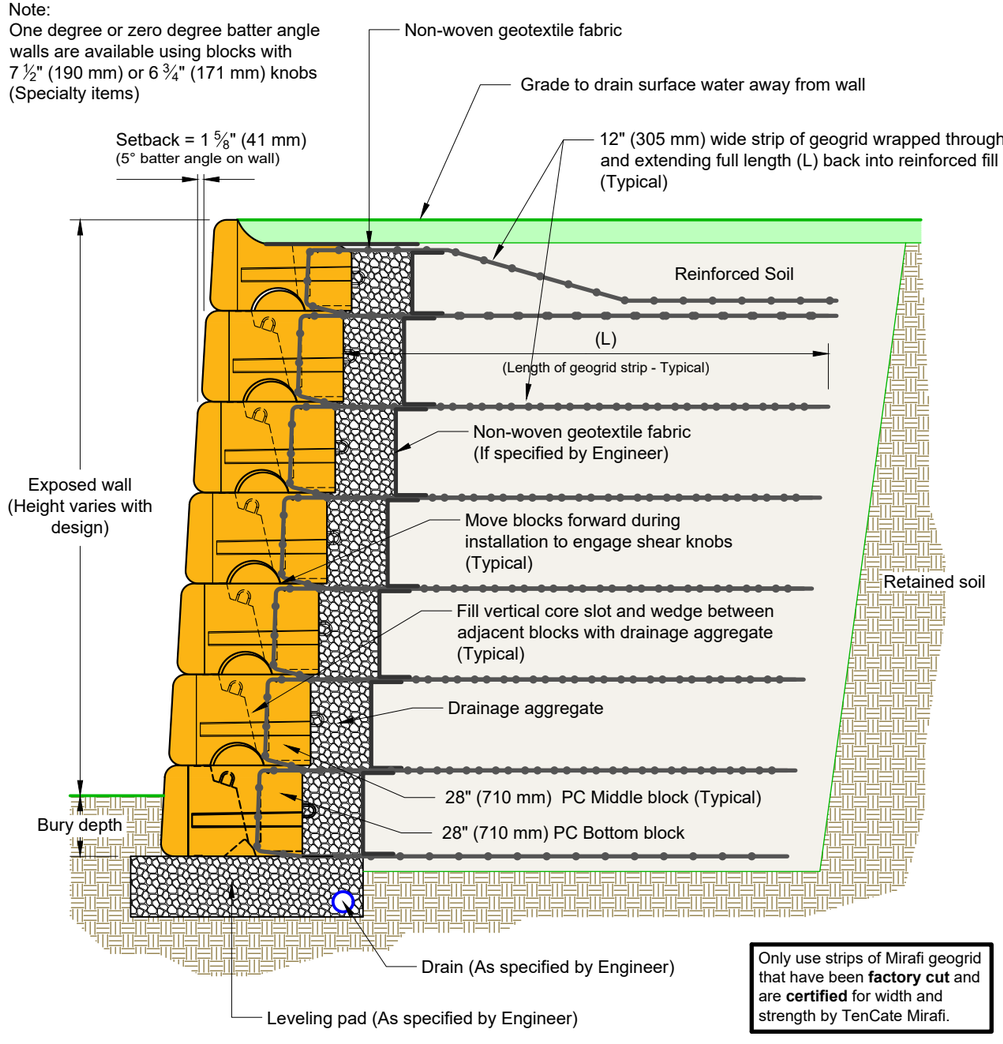
Typical Reinforced Wall Section

Note:
One degree or zero degree batter angle walls are available using blocks with 7 ½" (190 mm) or 6 ¾" (171 mm) knobs (Specialty items)



Only use strips of Mirafi geogrid that have been **factory cut** and are **certified** for width and strength by TenCate Mirafi.

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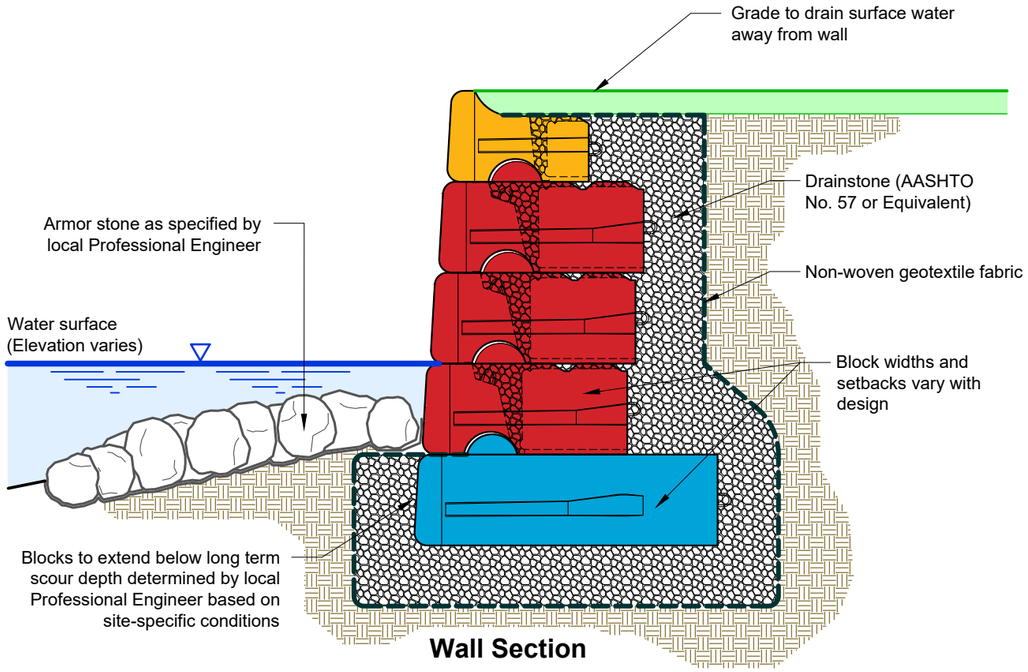
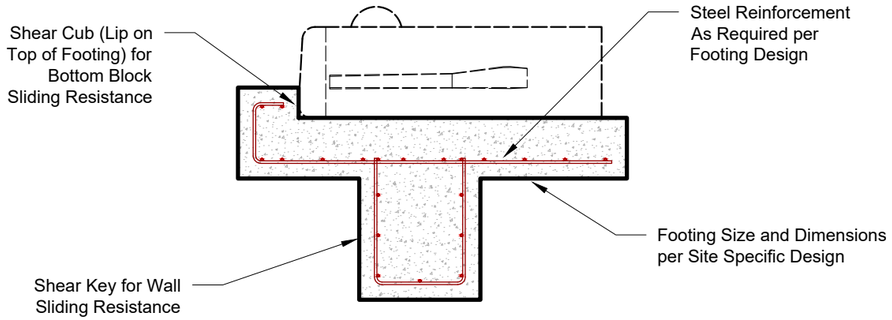
Conceptual Seawall Detail



Wall Section

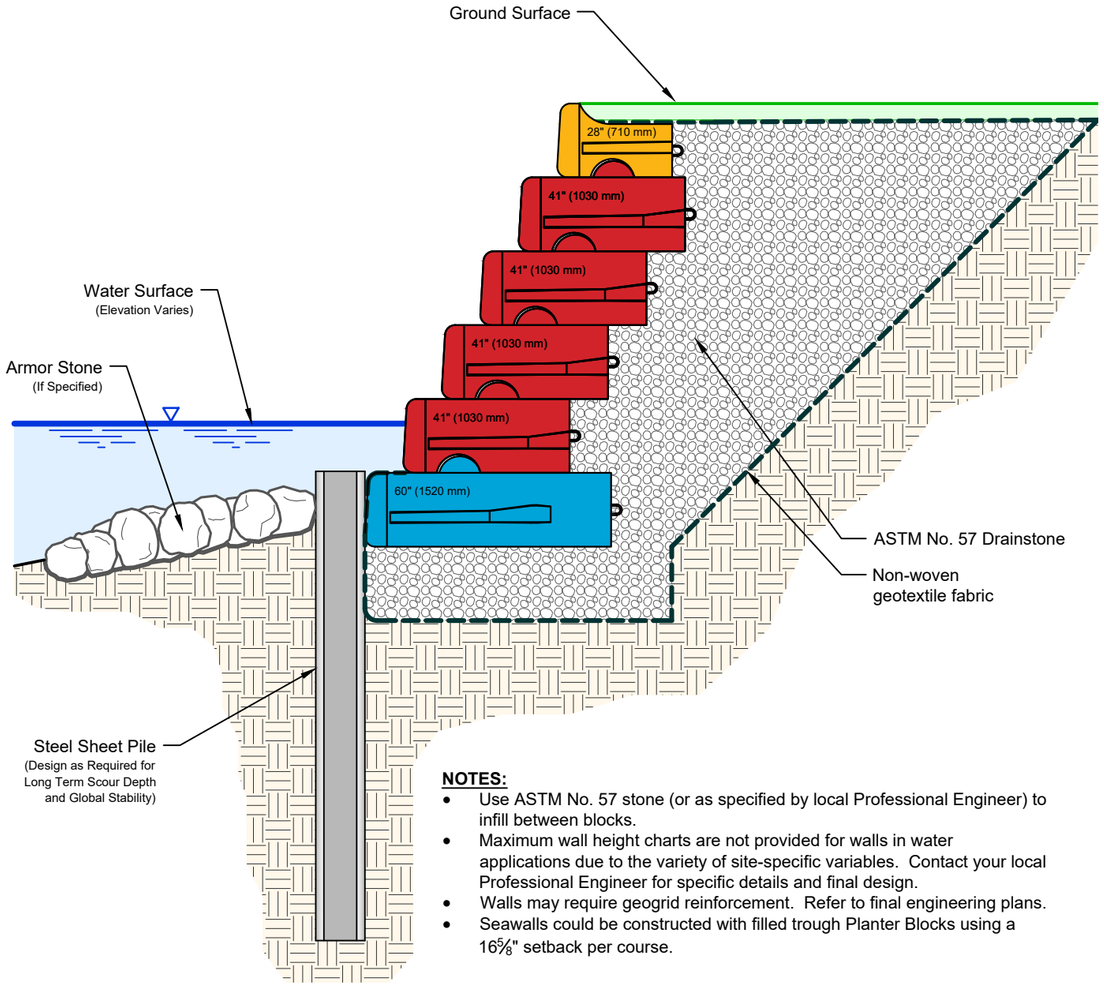
Notes:

- Use ASTM No. 57 stone (or as specified by local Professional Engineer) to infill between blocks.
- Preliminary wall height charts do not apply and should not be used for walls in water applications due to the variety of site-specific variables.
- Contact your local Professional Engineer for specific details and final design.
- Walls may require geogrid reinforcement.
- Refer to final engineering plans.



Optional Concrete Footing

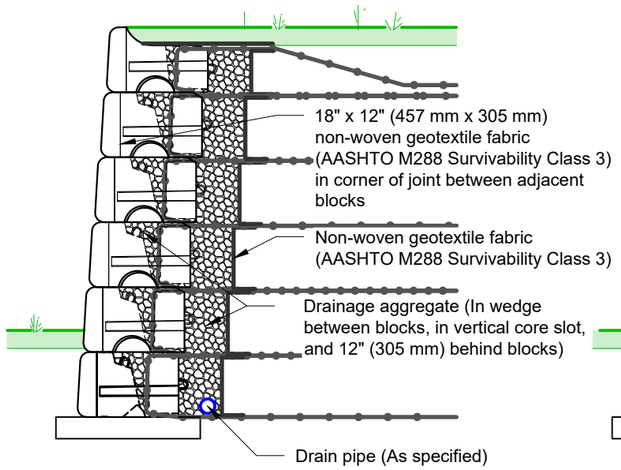
Conceptual Sheetpile Protected Seawall Detail



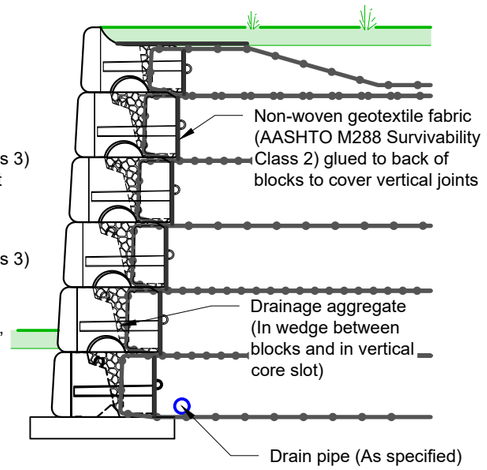
NOTES:

- Use ASTM No. 57 stone (or as specified by local Professional Engineer) to infill between blocks.
- Maximum wall height charts are not provided for walls in water applications due to the variety of site-specific variables. Contact your local Professional Engineer for specific details and final design.
- Walls may require geogrid reinforcement. Refer to final engineering plans.
- Seawalls could be constructed with filled trough Planter Blocks using a 16⅝" setback per course.

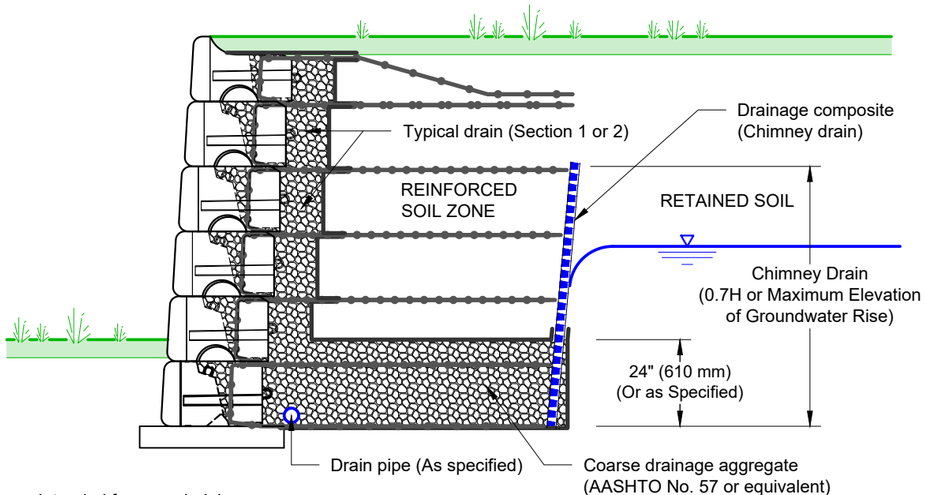
Internal Drainage Options



Typical Section - Option 1



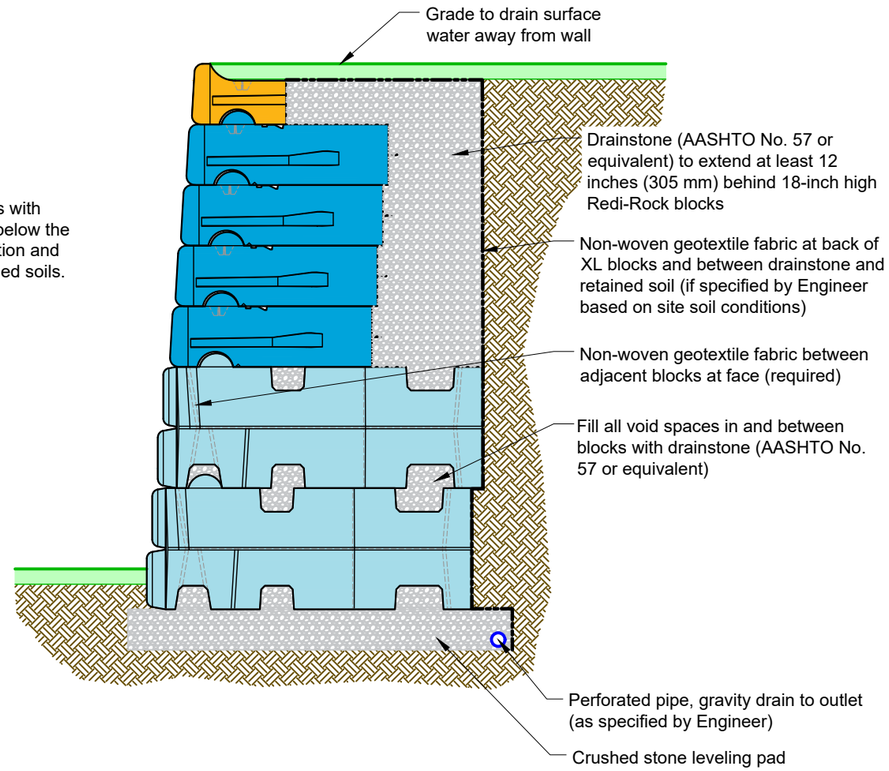
Typical Section - Option 2



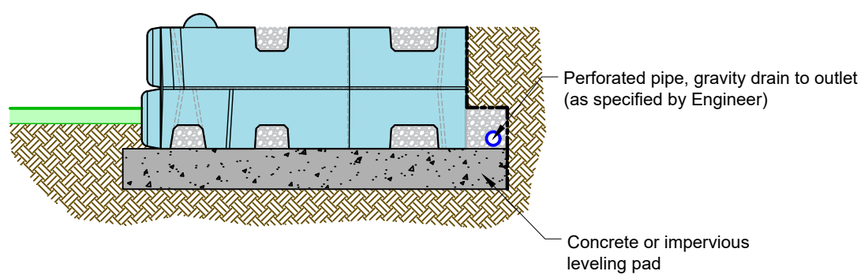
Blanket and Chimney Drain Section

Typical Drainage Detail - Cross Section

Applicable for sites with groundwater well below the leveling pad elevation and well-drained retained soils.



Alternate Detail for Concrete or Impervious Leveling Pad



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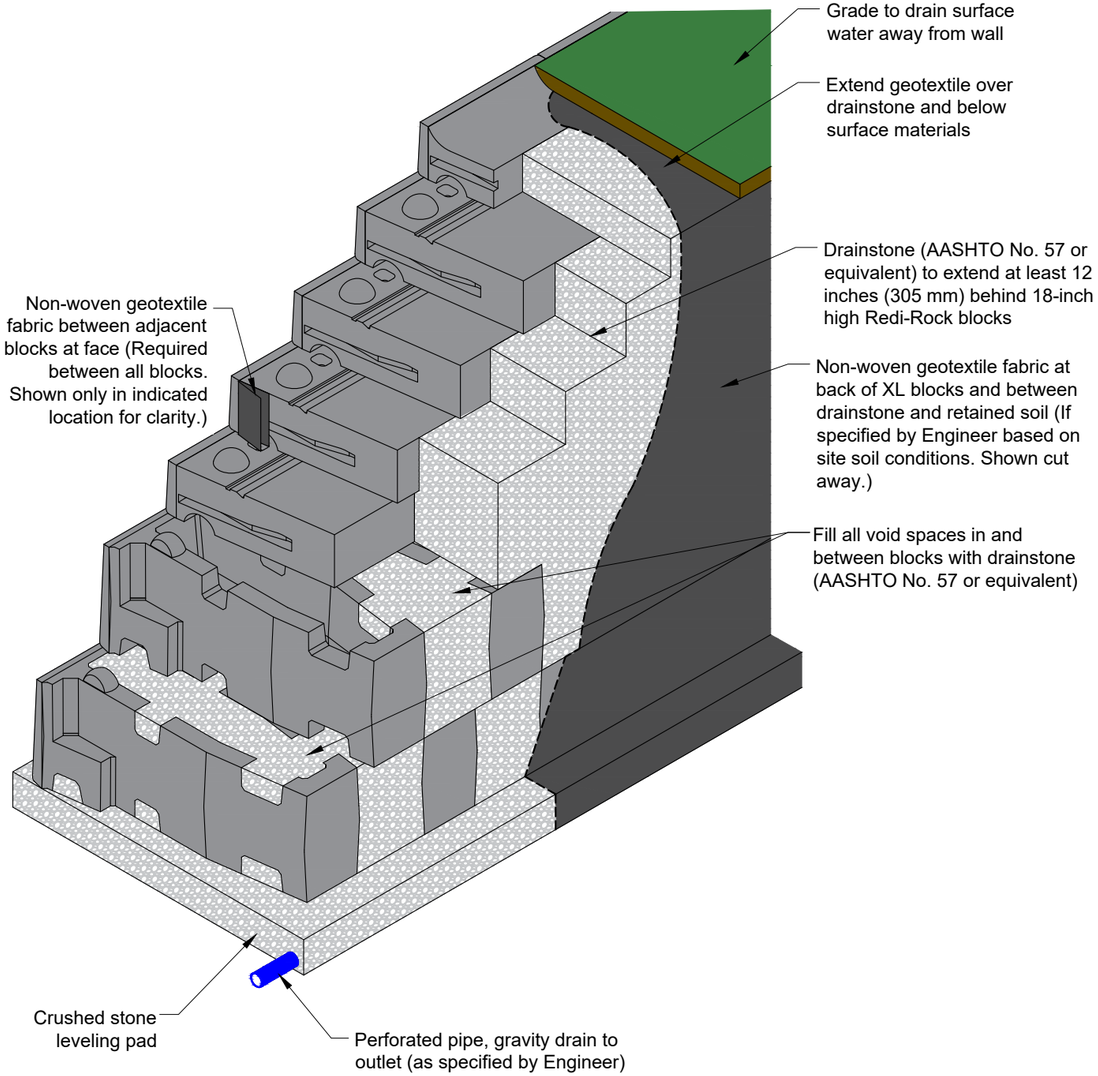
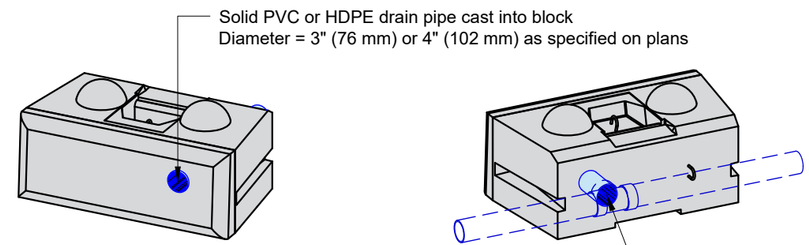
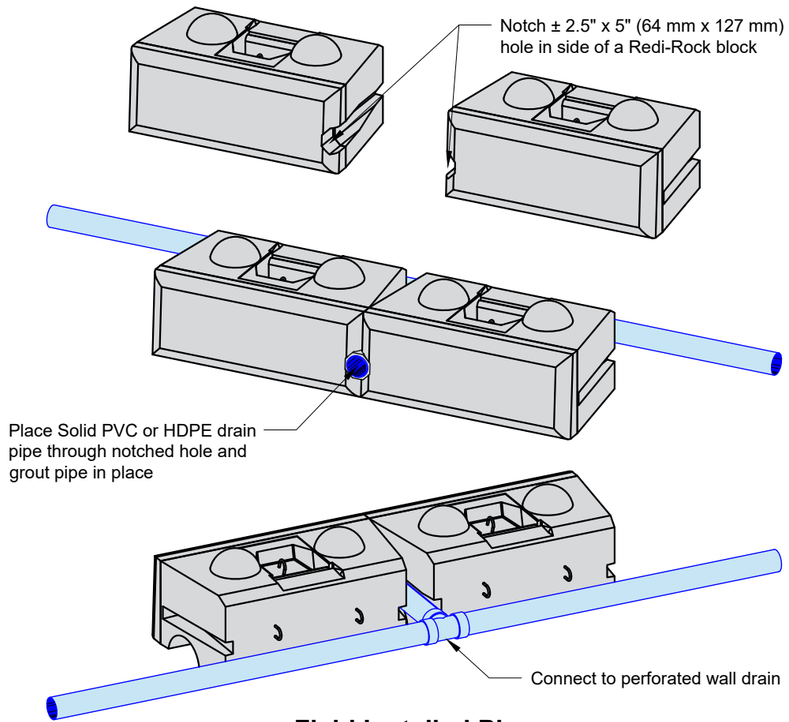
Typical Drainage Detail - Isometric View



Wall Drain Weep Hole Options

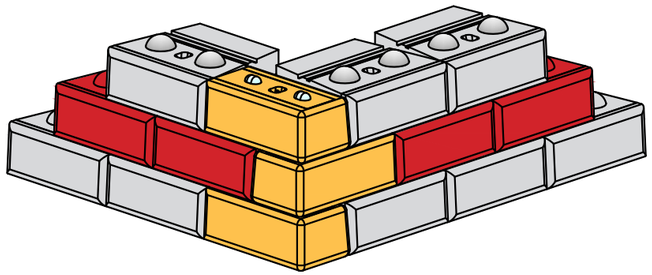


Custom Pipe Cast into Block



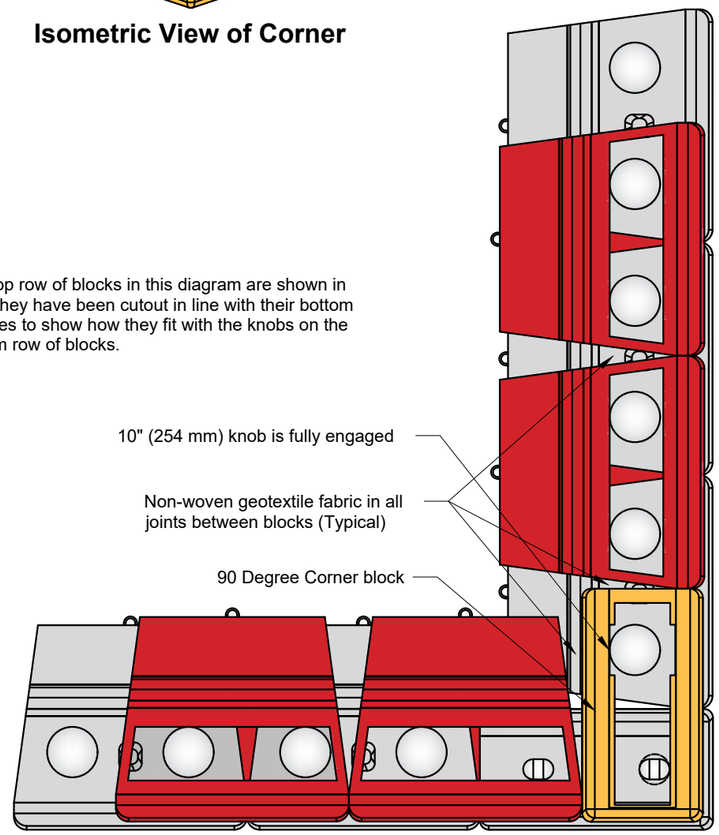
Field Installed Pipe

90° Outside Corner



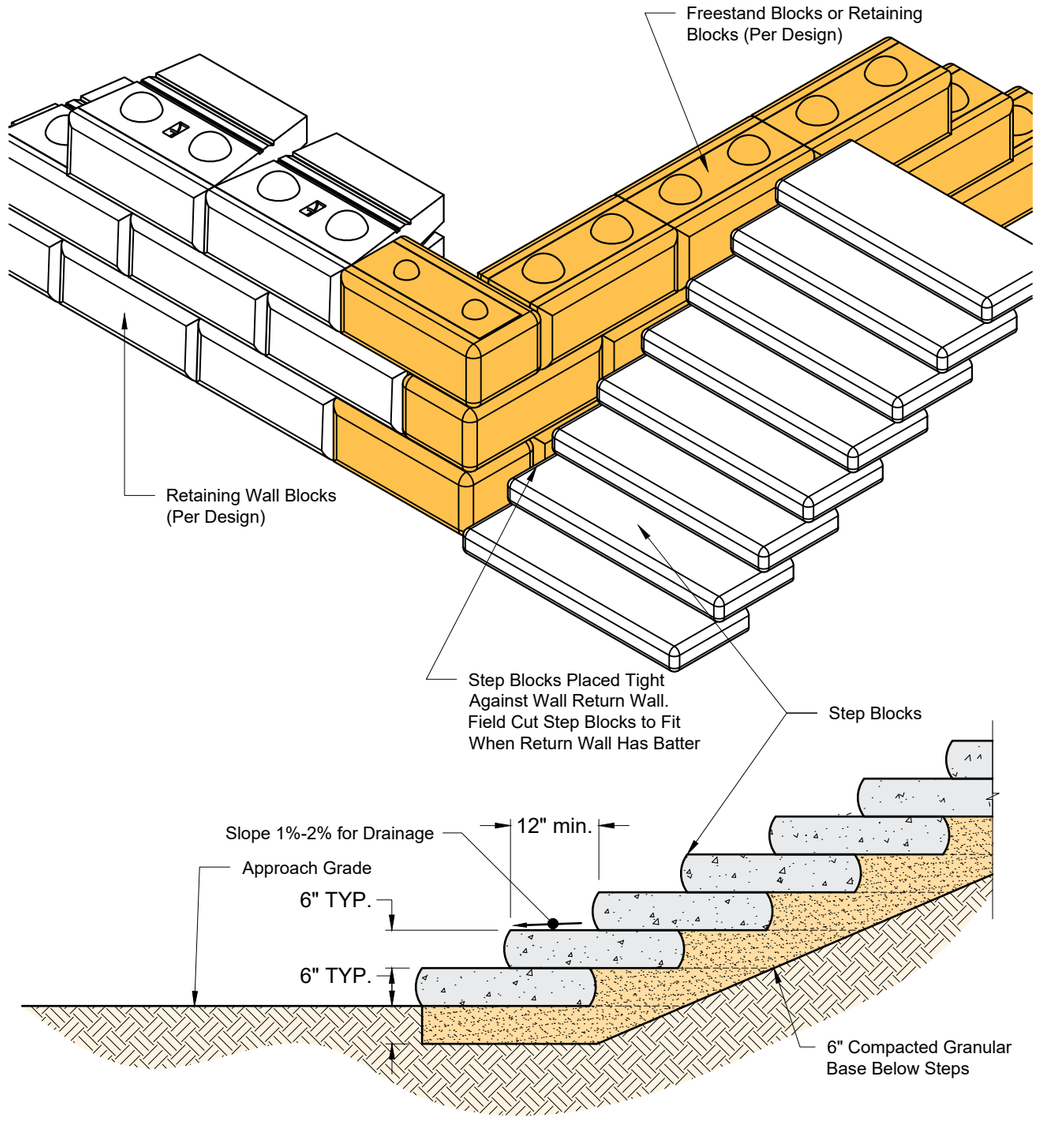
Isometric View of Corner

The top row of blocks in this diagram are shown in red. They have been cutout in line with their bottom grooves to show how they fit with the knobs on the bottom row of blocks.



Top View of Bottom Two Rows

Steps Through Wall



Stair Section

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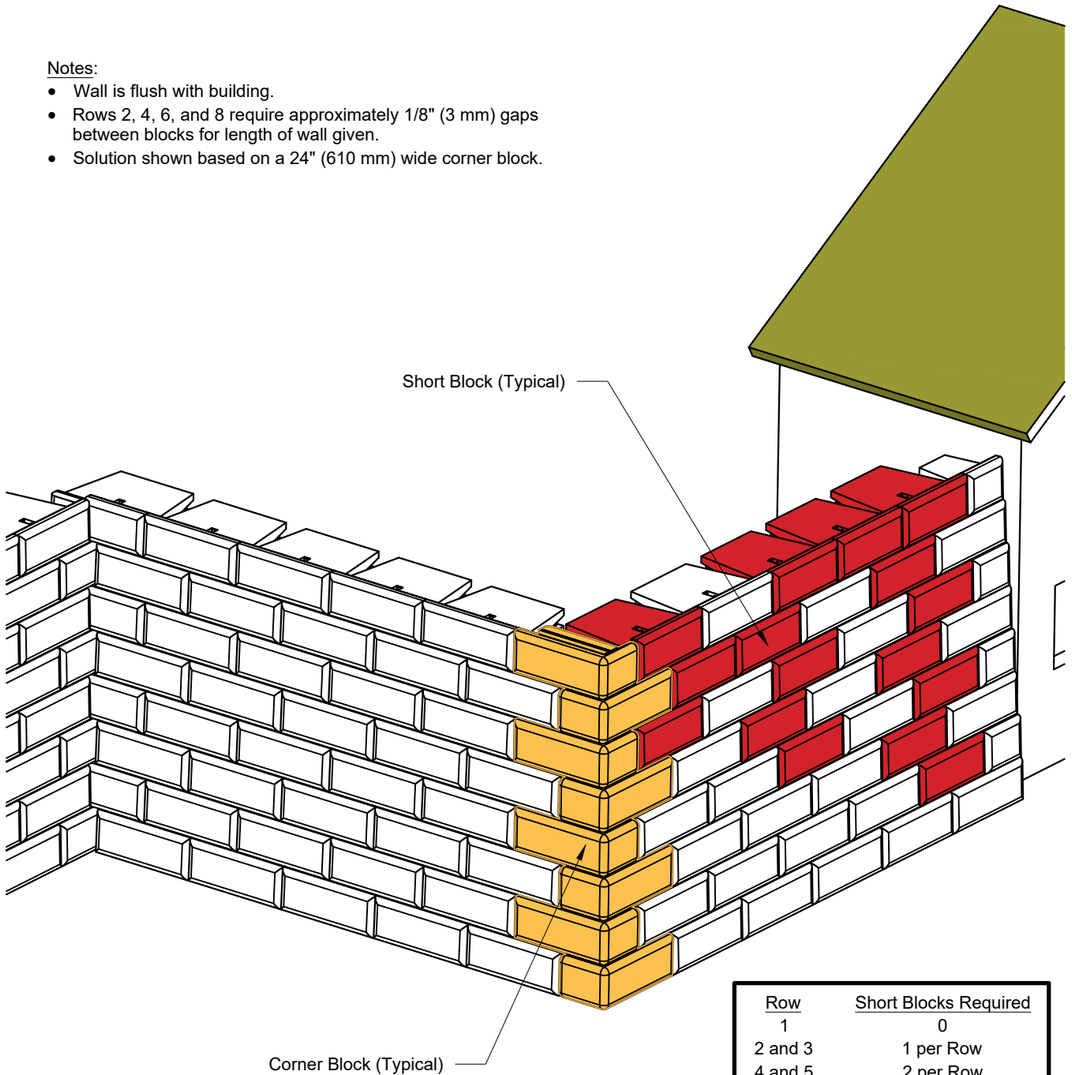
Flush End to 90° Corner

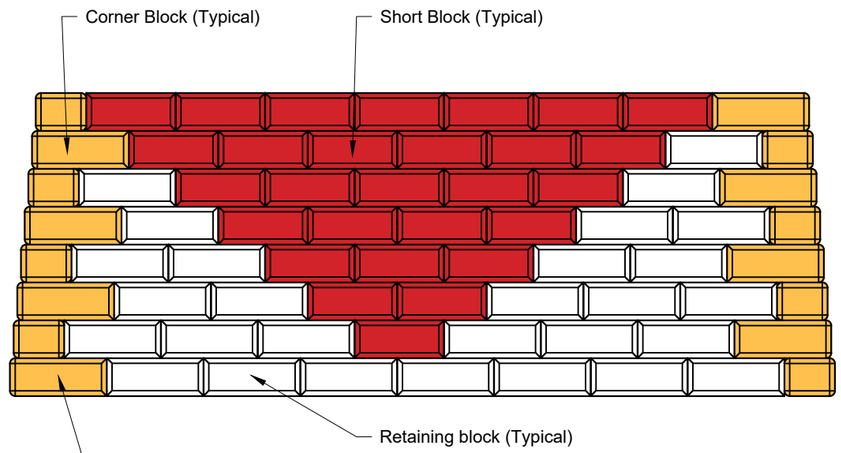
Notes:

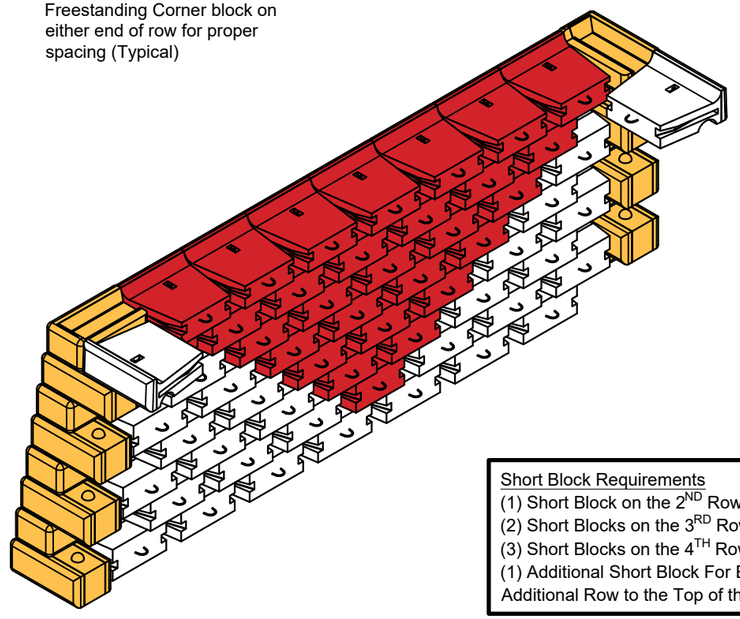
- Wall is flush with building.
- Rows 2, 4, 6, and 8 require approximately 1/8" (3 mm) gaps between blocks for length of wall given.
- Solution shown based on a 24" (610 mm) wide corner block.



Row	Short Blocks Required
1	0
2 and 3	1 per Row
4 and 5	2 per Row
6 and 7	3 per Row
8	4 per Row

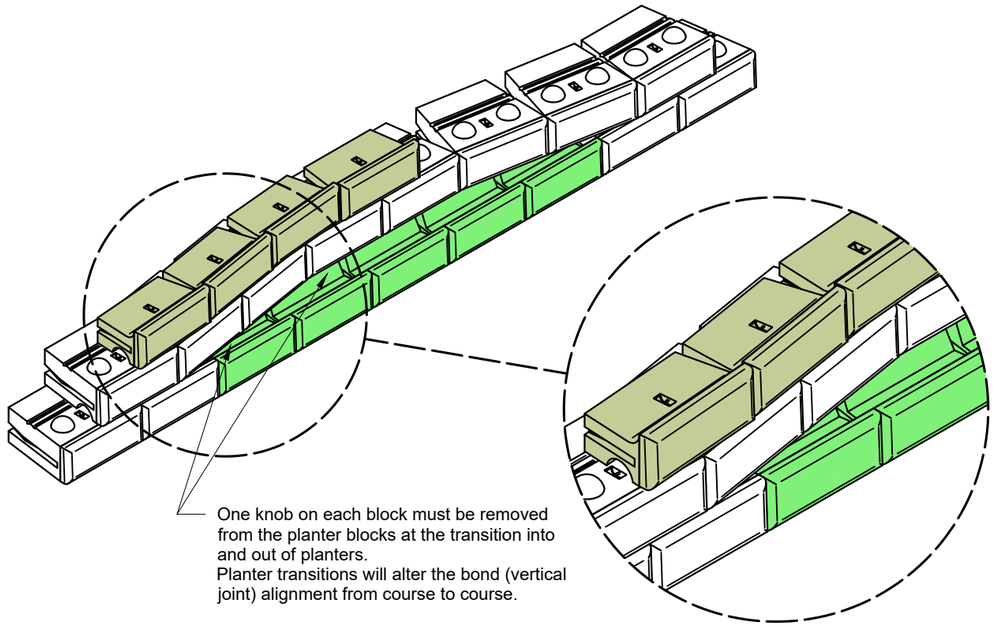
Double 90° Outside Corner - Short Block Solution

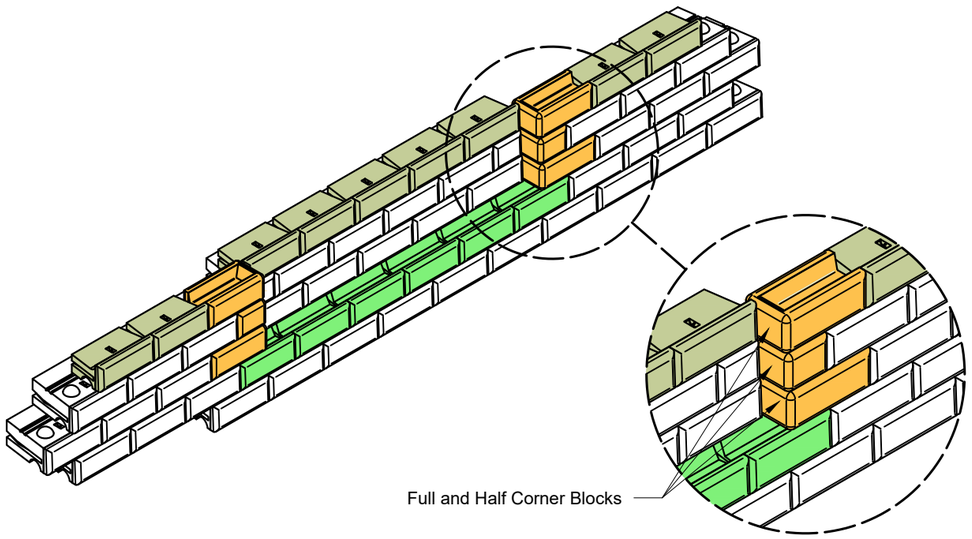




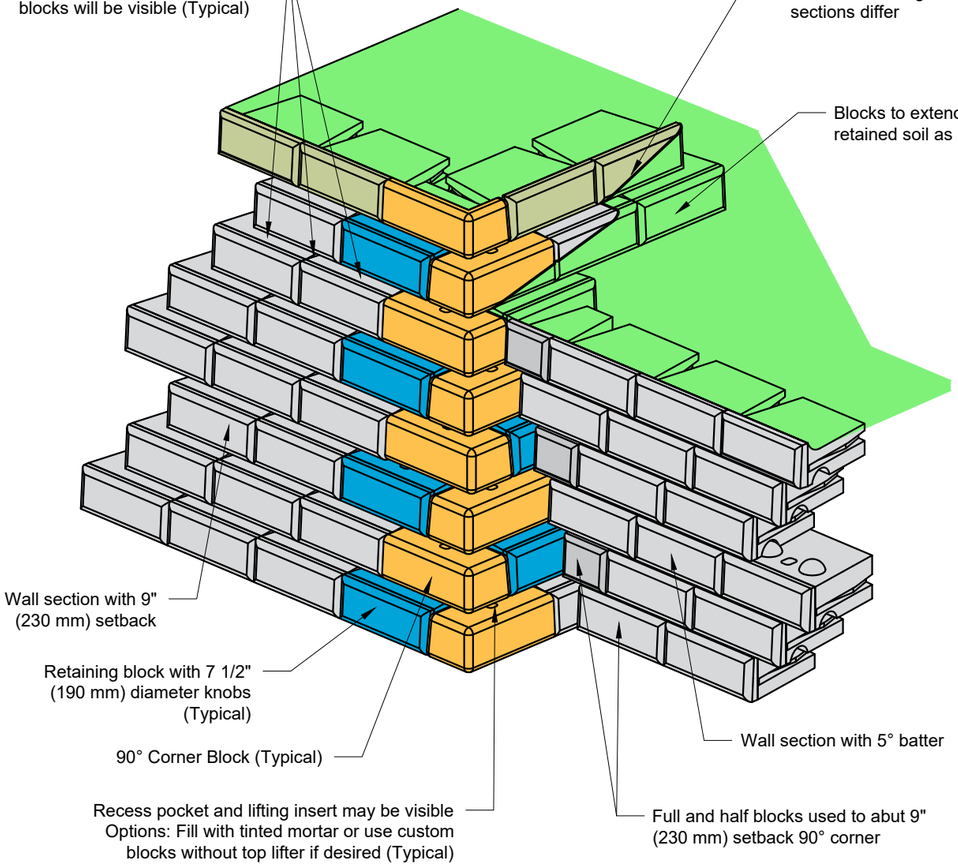
Short Block Requirements
(1) Short Block on the 2ND Row
(2) Short Blocks on the 3RD Row
(3) Short Blocks on the 4TH Row
(1) Additional Short Block For Every Additional Row to the Top of the Wall

Transitions Into Planters



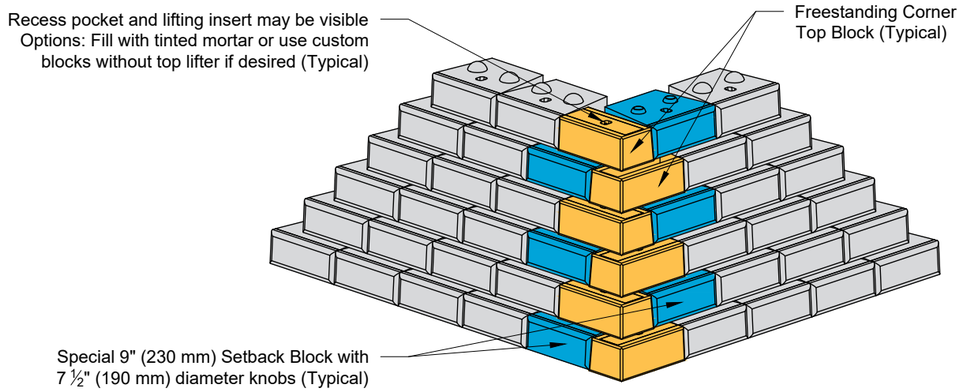


Transition From 5° Batter to 9" (230 mm) Setback

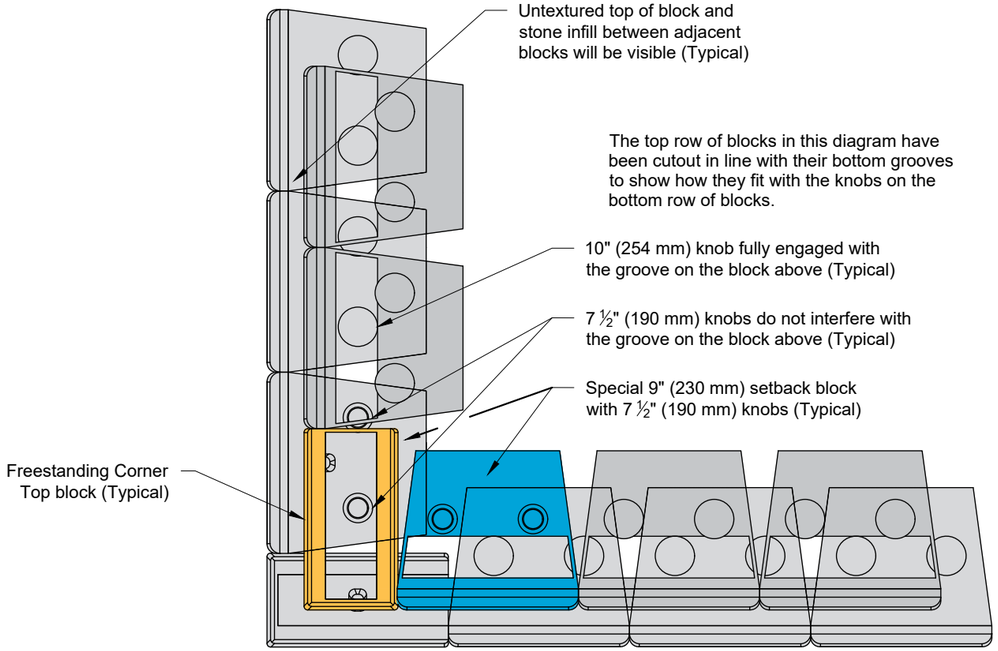


Preferred option is to start construction at transition and work away in both directions.
If construction cannot start at transition, blocks must be field cut as needed to fit.

90° Outside Corner for 9" (230 mm) Setback Walls



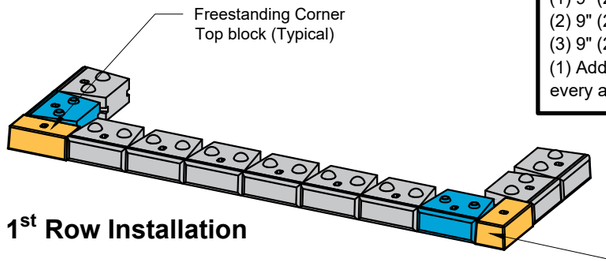
Multiple Row Installation



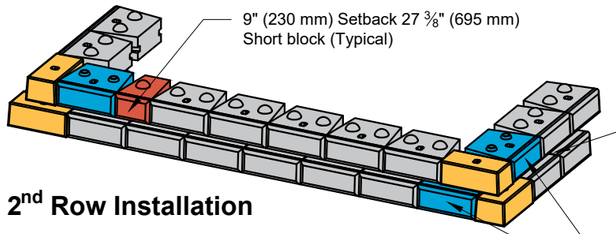
Top View of Bottom Two Rows

Double 90° Outside Corner for 9" (230 mm) Setback Walls

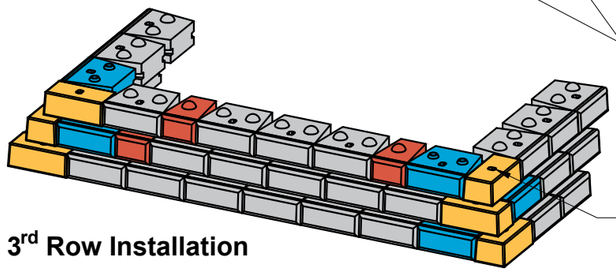
Short Block Requirements
(1) 9" (230 mm) Setback Short block on the 2nd row
(2) 9" (230 mm) Setback Short block on the 3rd row
(3) 9" (230 mm) Setback Short block on the 4nd row
(1) Additional 9" (230 mm) Setback Short block for every additional row to the top of the wall



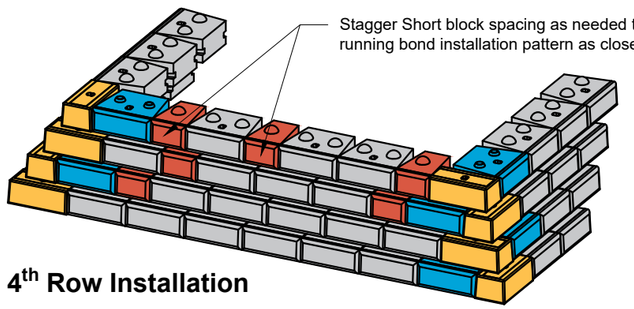
1st Row Installation



2nd Row Installation

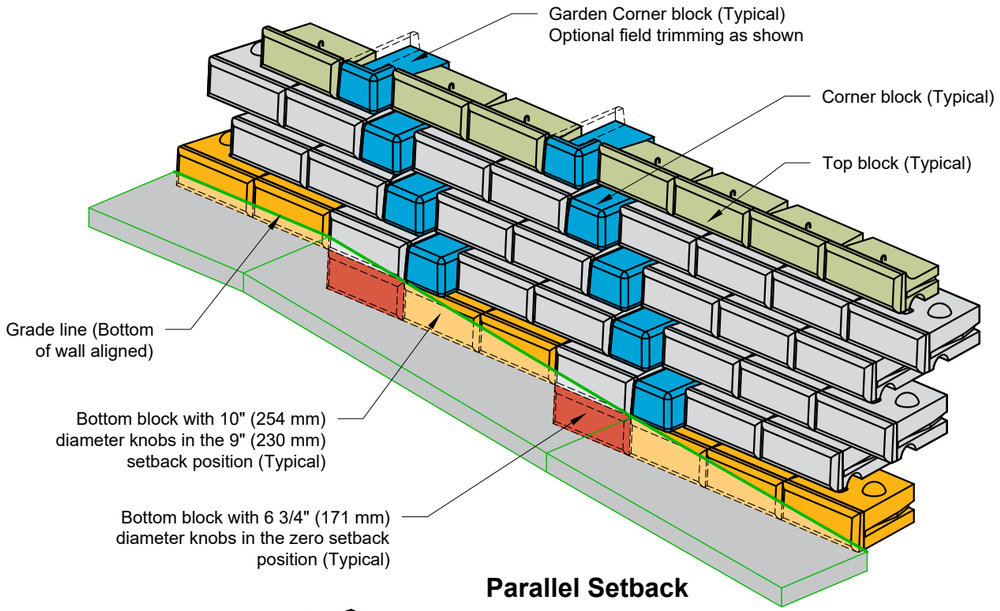


3rd Row Installation

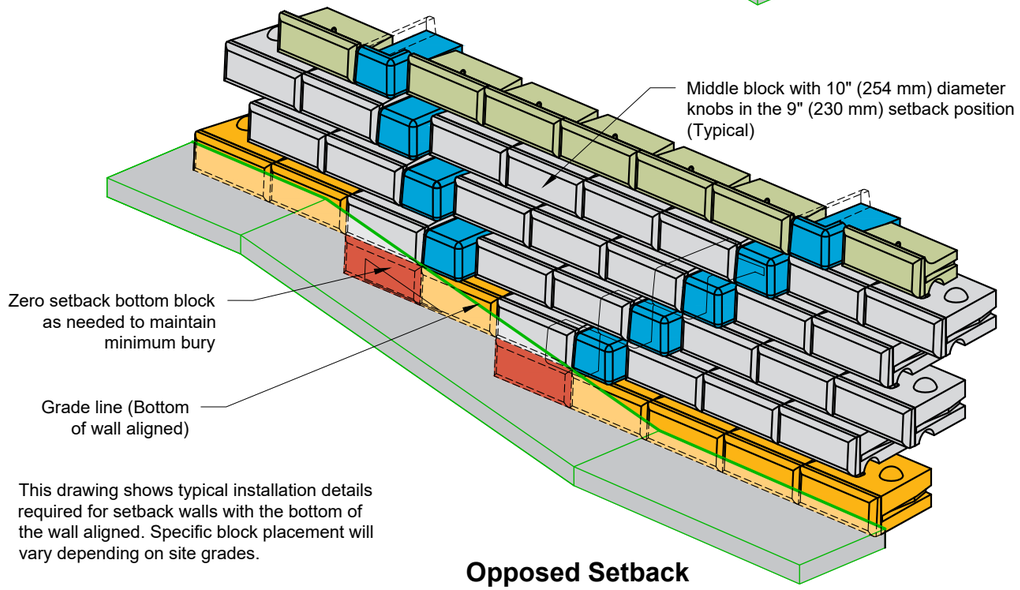


4th Row Installation

Stepped 9" (230 mm) Setback Wall with Aligned Base



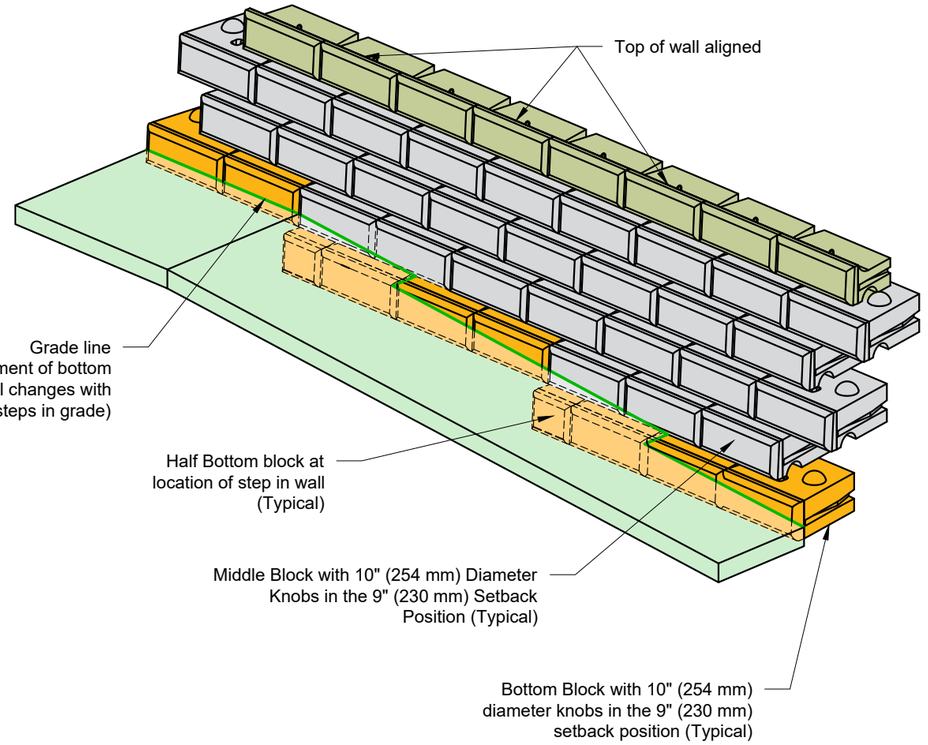
Parallel Setback



This drawing shows typical installation details required for setback walls with the bottom of the wall aligned. Specific block placement will vary depending on site grades.

Opposed Setback

Stepped 9" (230 mm) Setback Wall with Aligned Top



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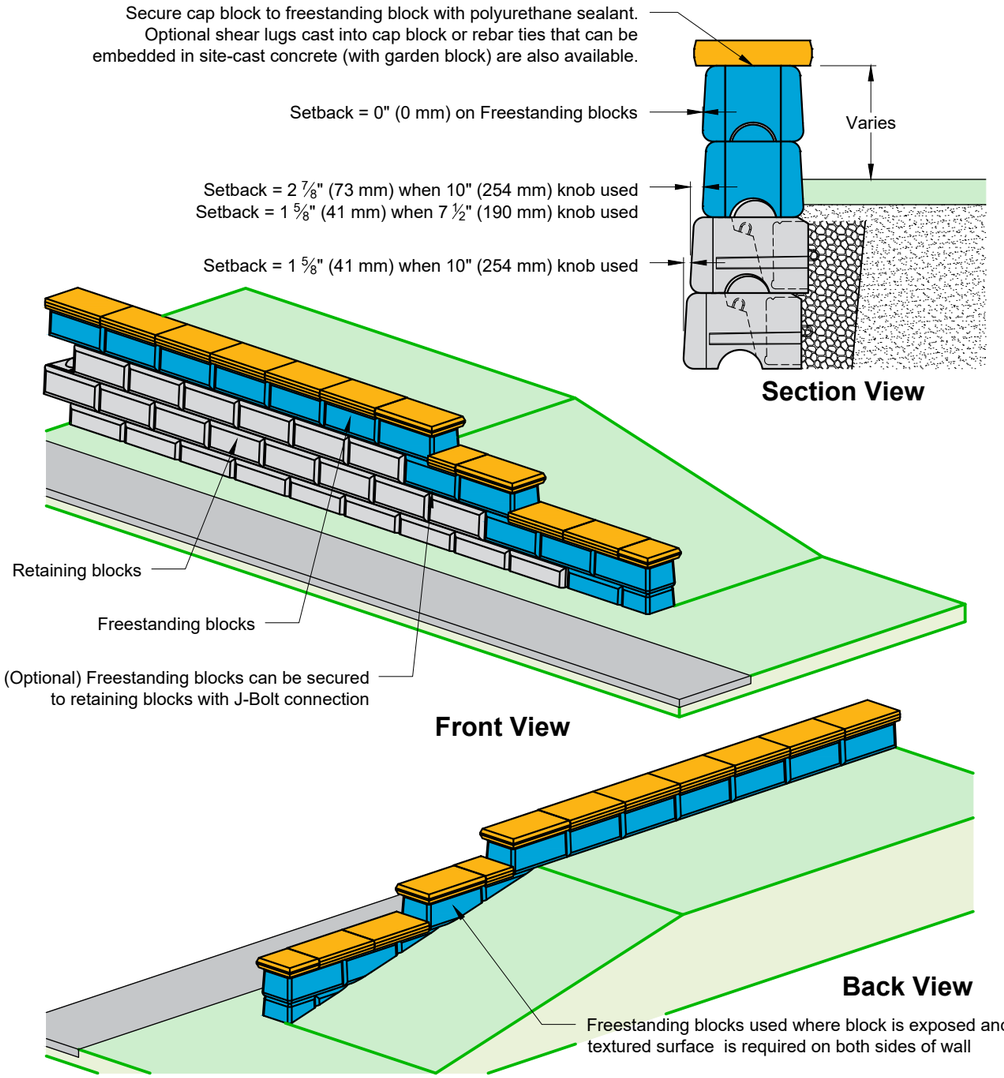
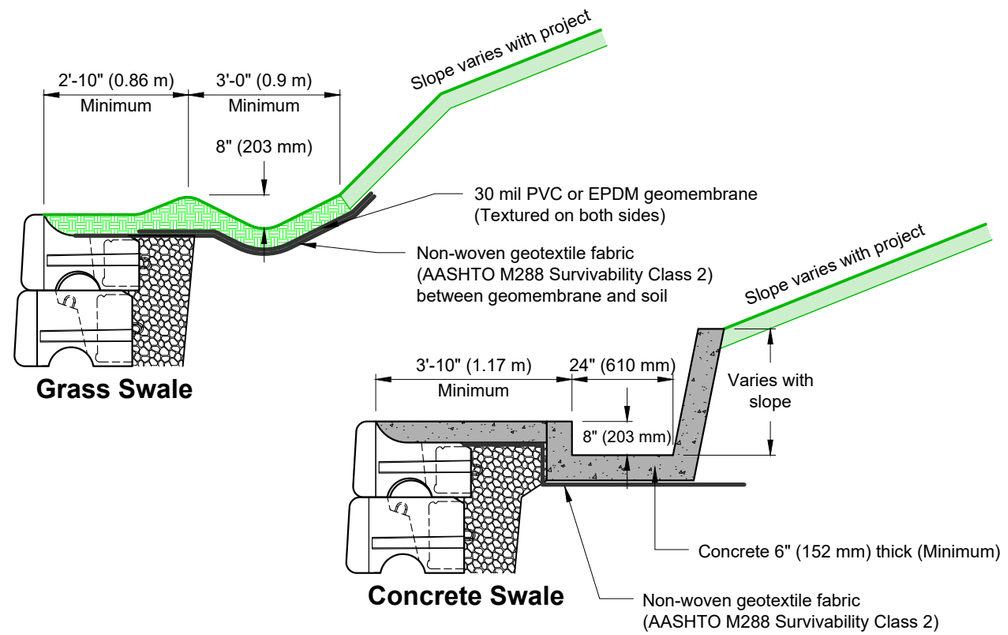
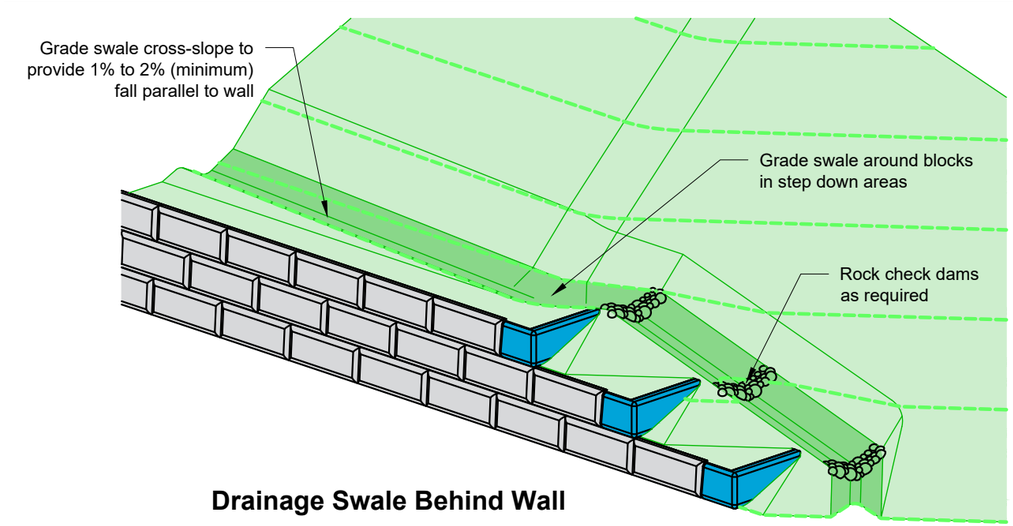
Freestanding and Cap Block Coping



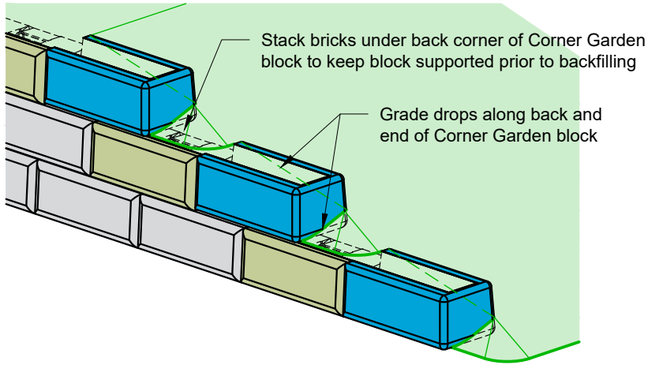
One-component, highly flexible, non-priming, gun grade, high performance elastomeric polyurethane sealant shall have movement of plus or minus 25% per ASTM C719, tensile strength greater than 200 psi (1.4 MPa) per ASTM D412, and adhesion to peel on concrete greater than 20 PLI per ASTM C794. Apply sealant in one and one half-inch (1.5") (38 mm) diameter round "hersey kiss" shaped dollops located in two rows at the top of the Freestanding blocks at 8" (203 mm) on center.

Drainage Swale Options

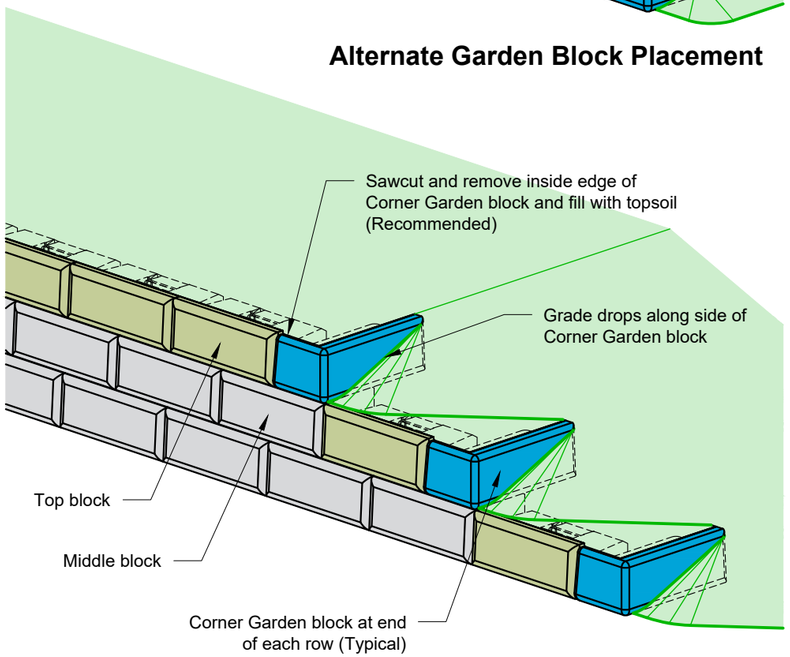




Top Block Coping Option



Alternate Garden Block Placement



Note: Corner Garden Blocks are shown, Half Corner Garden Blocks are optional as grading permits.

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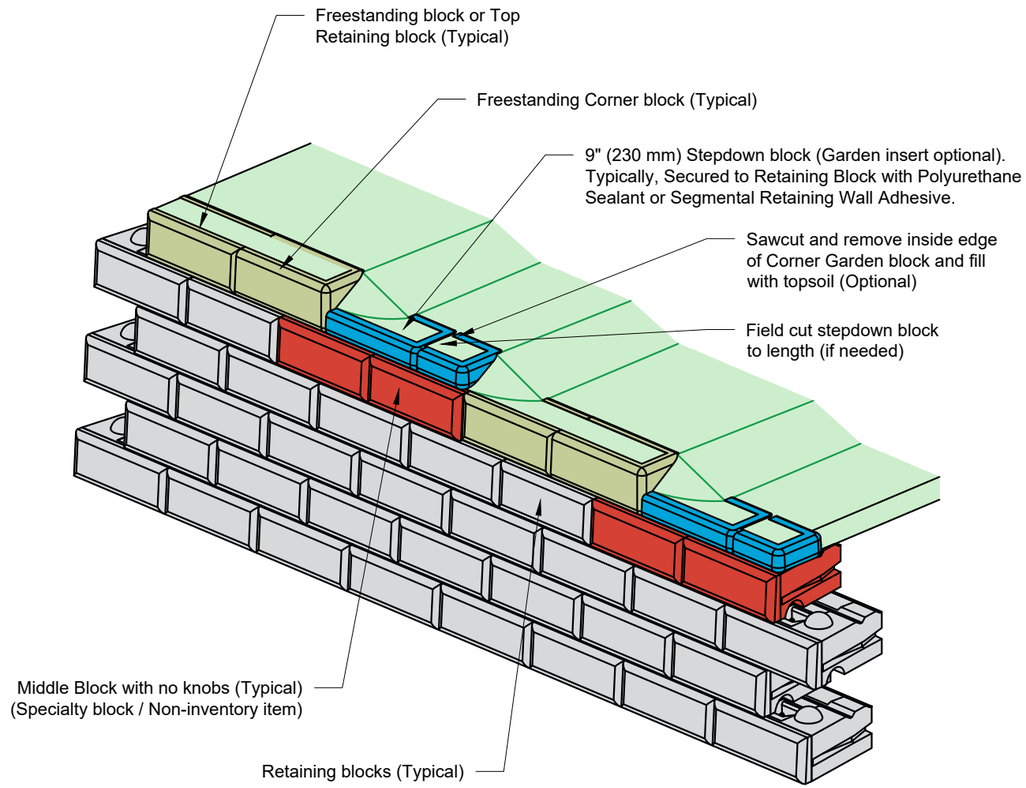
Grade Change on Top of Wall Using 9" (230 mm) Stepdown Blocks



Sealant Adhesive: One-component, highly flexible, non-priming, gun grade, high performance elastomeric polyurethane sealant shall have movement of plus or minus 25% per ASTM C719, tensile strength greater than 200 psi (1.4 MPa) per ASTM D412, and adhesion to peel on concrete greater than 20 PLI per ASTM C794. Apply sealant in one and one half-inch (1.5") (38 mm) diameter round “hersey kiss” shaped dollops located in two rows at 8” (203 mm) on center, immediately below the 9" (230mm) Stepdown Block.

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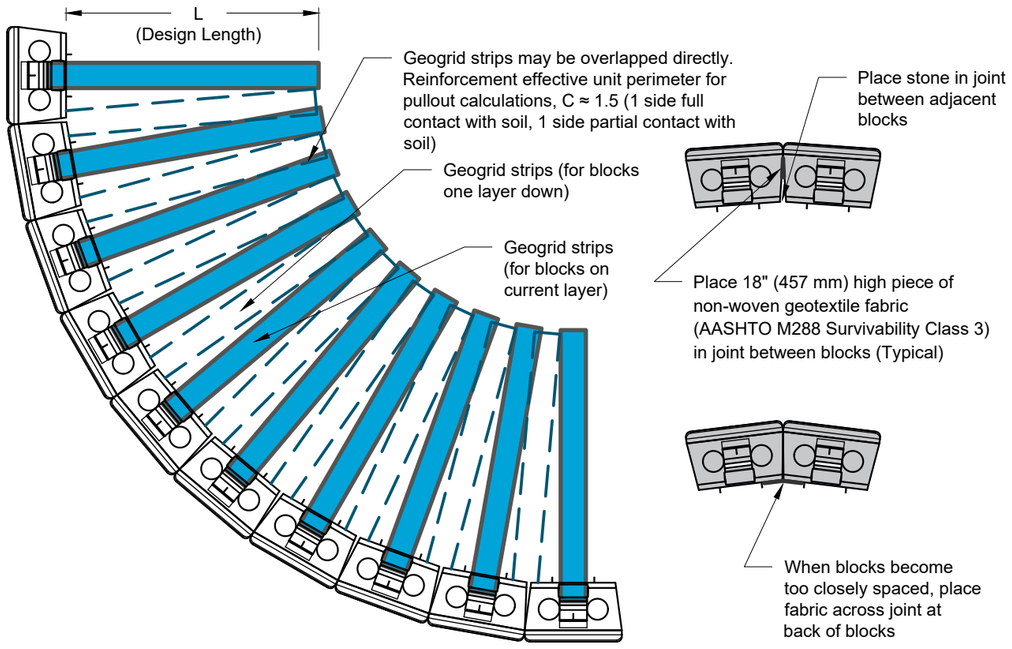
Geogrid Layout for Convex Curves and Radial Corners

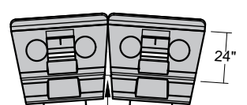


Minimum radius for bottom row

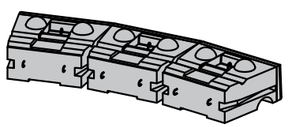
Number of courses	Height of wall	Radius from face of block	Distance between blocks*
1	1'-6" (0.46 m)	14'-6" (4.42 m)	0.13" (3 mm)
2	3'-0" (0.91 m)	14'-8" (4.47 m)	0.21" (5 mm)
3	4'-6" (1.37 m)	14'-10" (4.52 m)	0.28" (7 mm)
4	6'-0" (1.83 m)	15'-0" (4.57 m)	0.36" (9 mm)
5	7'-6" (2.29 m)	15'-2" (4.62 m)	0.43" (11 mm)
6	9'-0" (2.74 m)	15'-4" (4.67 m)	0.50" (13 mm)
7	10'-6" (3.20 m)	15'-6" (4.72 m)	0.57" (15 mm)
8	12'-0" (3.66 m)	15'-8" (4.78 m)	0.63" (16 mm)
9	13'-6" (4.11 m)	15'-10" (4.83 m)	0.70" (18 mm)
10	15'-0" (4.57 m)	16'-0" (4.88 m)	0.76" (19 mm)
11	16'-6" (5.03 m)	16'-2" (4.93 m)	0.83" (21 mm)
12	18'-0" (5.49 m)	16'-4" (4.98 m)	0.88" (22 mm)
13	19'-6" (5.94 m)	16'-6" (5.03 m)	0.95" (24 mm)
14	21'-0" (6.40 m)	16'-8" (5.08 m)	1.01" (26 mm)

* Distance between blocks is measured at the back of 28" (710 mm) blocks and 24" (610 mm) behind the form parting line (back edge of face texture) for 41" (1030 mm) blocks. This distance is intended to be a guide only. Minimum radius is controlling.

14'-6" (4.42 m) is the minimum radius for Redi-Rock blocks. It occurs when all the blocks are placed tight together. A larger radius is required on the bottom row of a Redi-Rock wall to account for the batter between courses of blocks and still provide enough space to construct the top row of blocks.

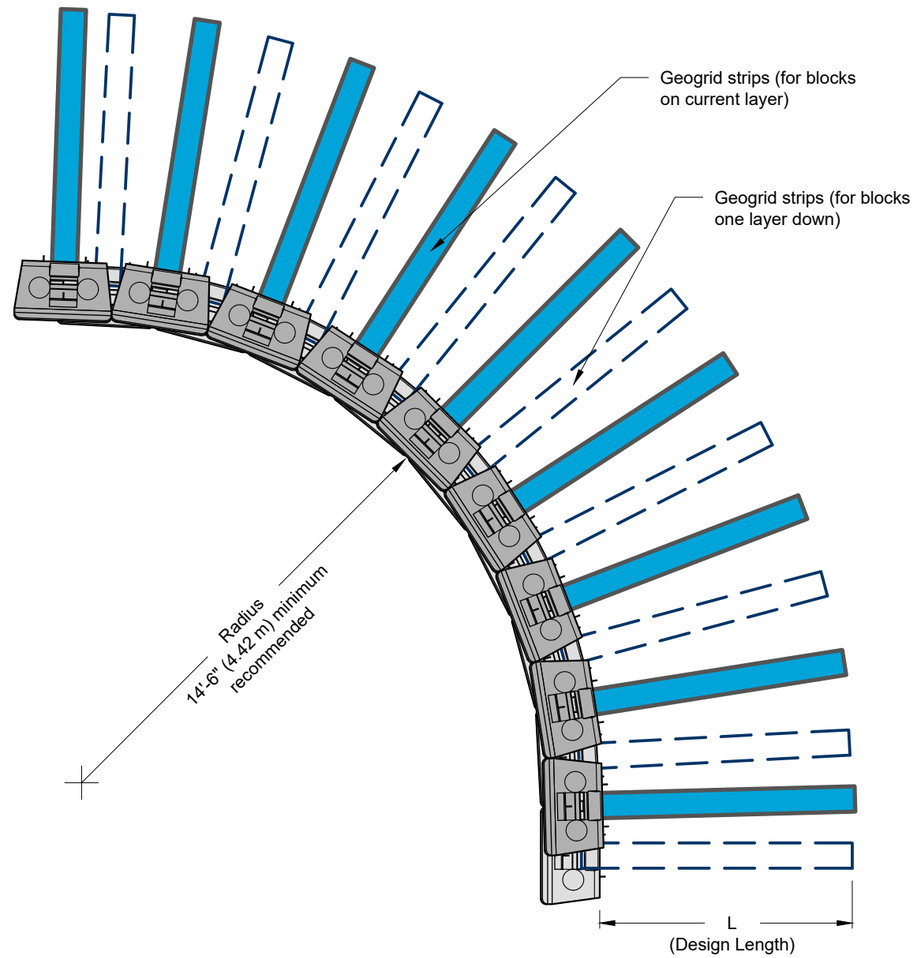


Top View

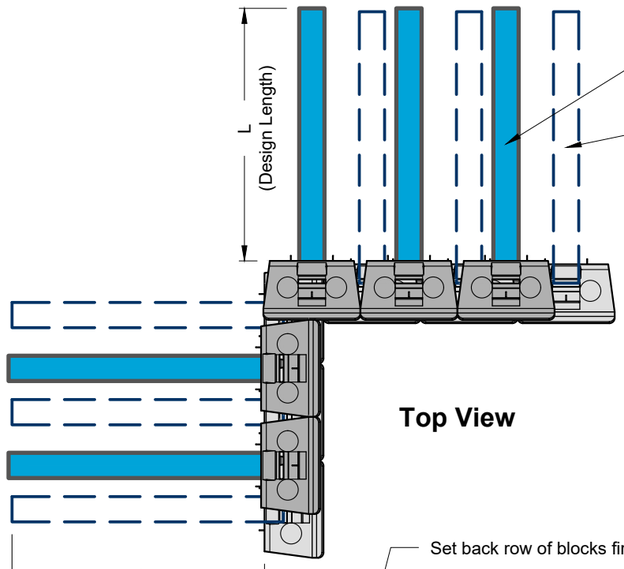


Back View

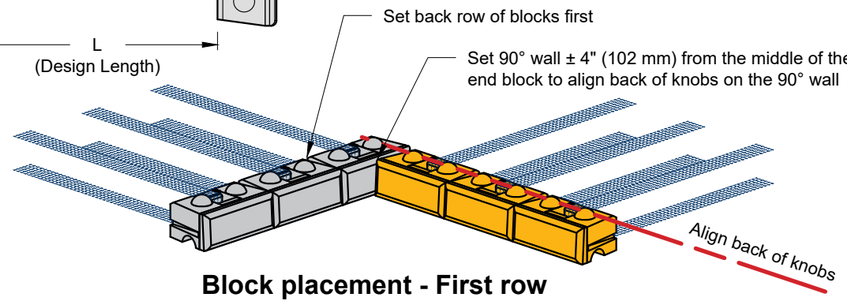
Geogrid Layout for Concave Curves and Radial Corners



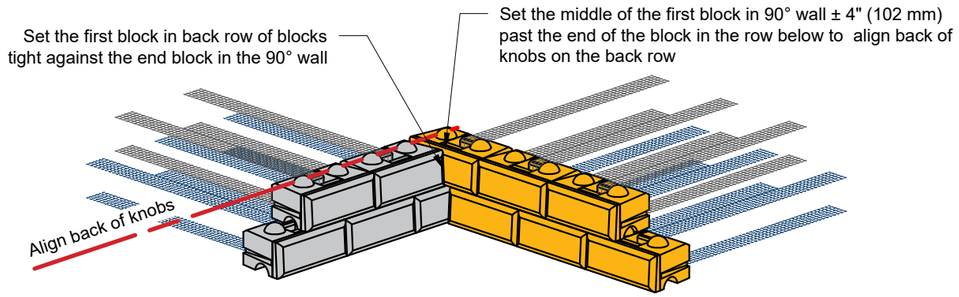
Geogrid Layout for 90° Inside Corner



Top View



Block placement - First row



Block placement - Second row

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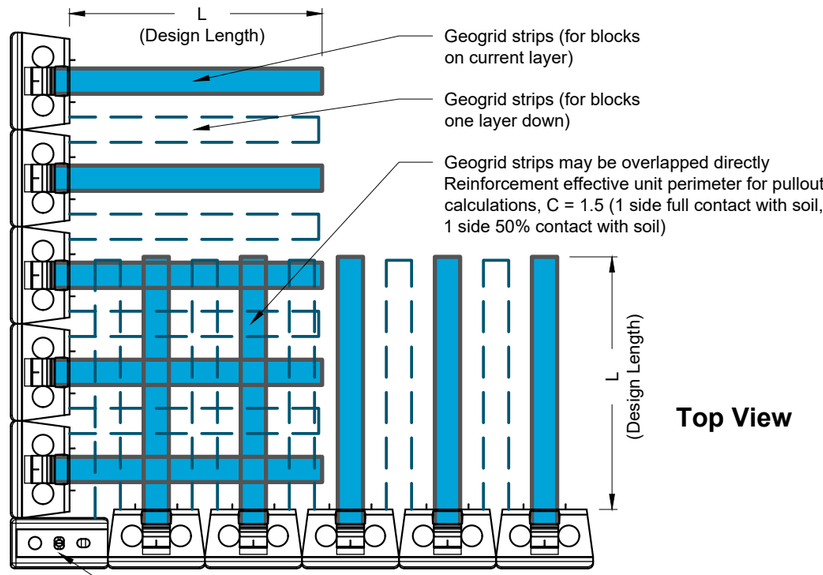
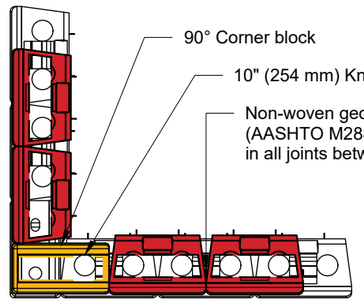
Geogrid Layout for 90° Outside Corner



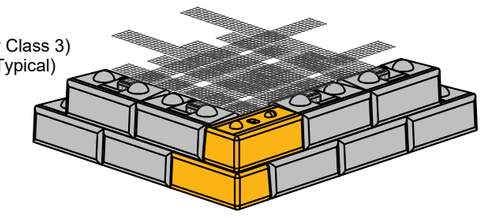
Top View

Block Layout for 90° Outside Corner

The top row of blocks are shown in red. They have been cutout in line with their bottom grooves to show how they fit with the knobs on the bottom row of block. The geogrid strips are not shown for clarity.



Top View of Corner



3D View of Corner

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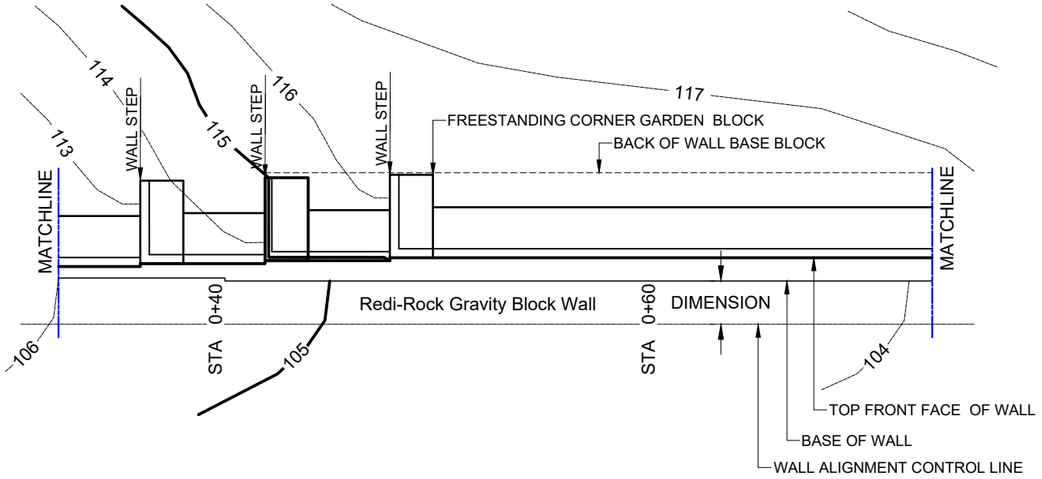
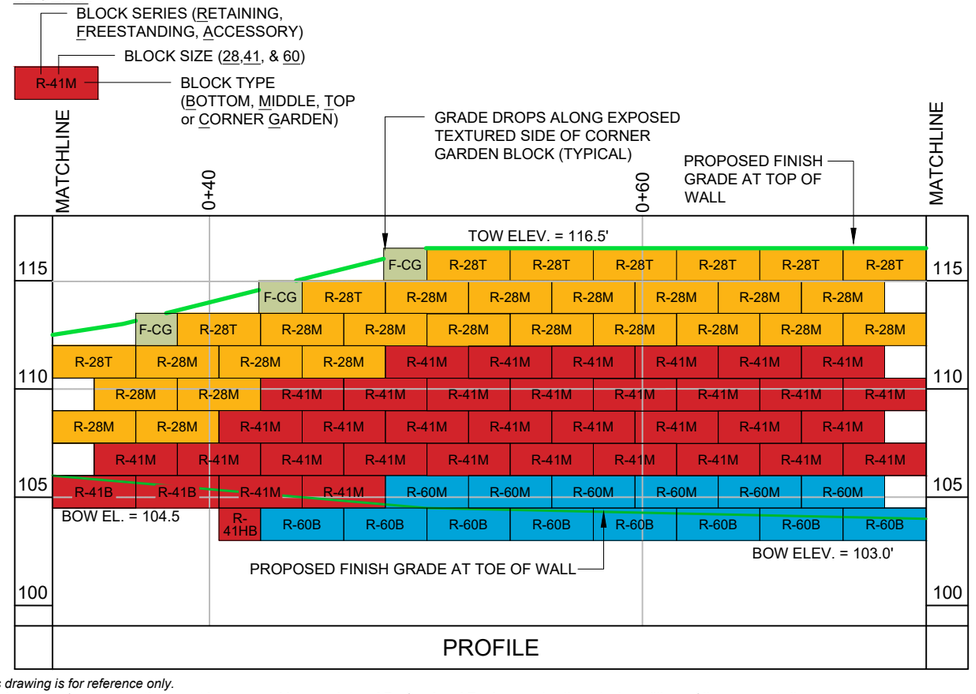
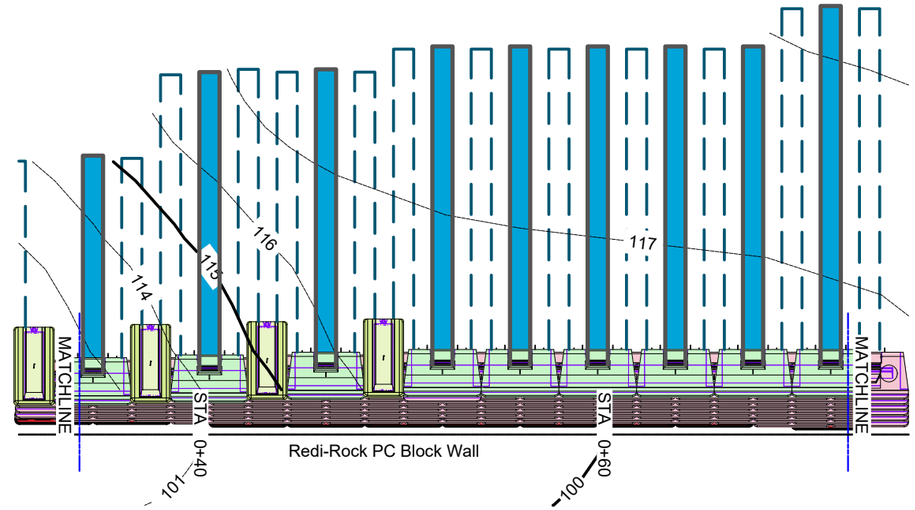
Sample Plan and Profile Gravity Wall

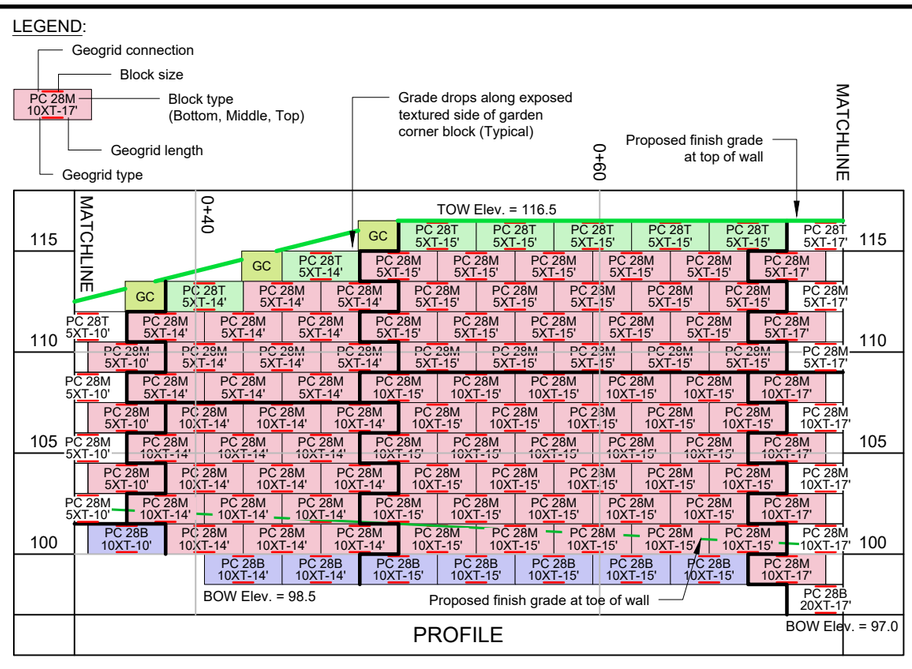




- *This drawing is for reference only.*
- ***Final designs for construction must be prepared by a registered Professional Engineer** using the actual conditions of the proposed site.*
- ***Final wall design must address both internal and external drainage and shall be evaluated by the Professional Engineer who is responsible for the wall design.***

Sample Plan and Profile Positive Connection MSE Wall





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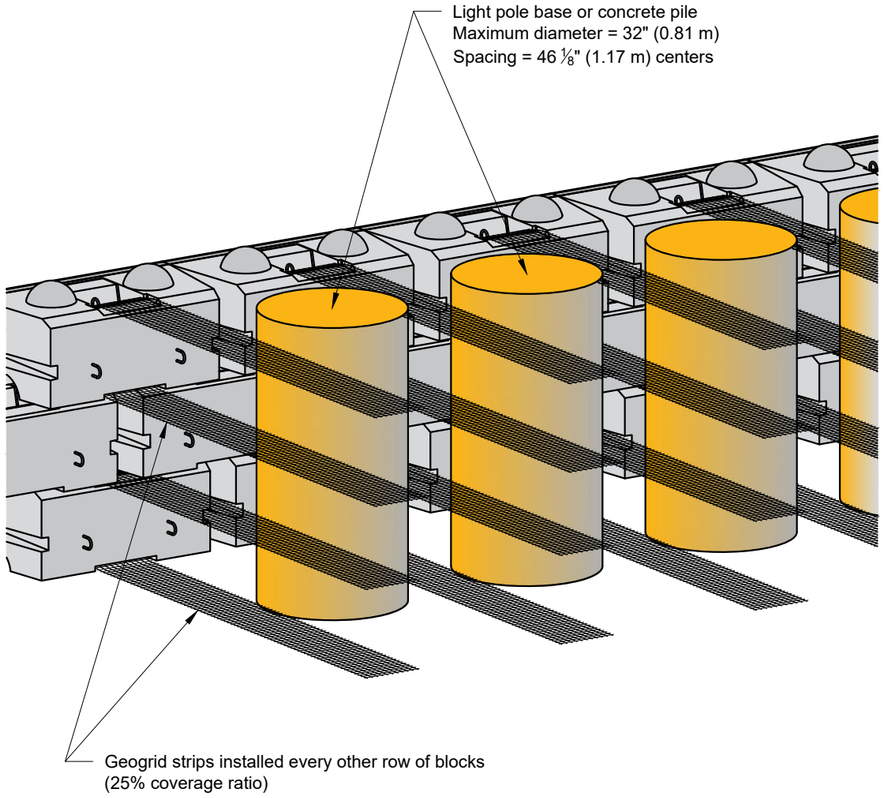
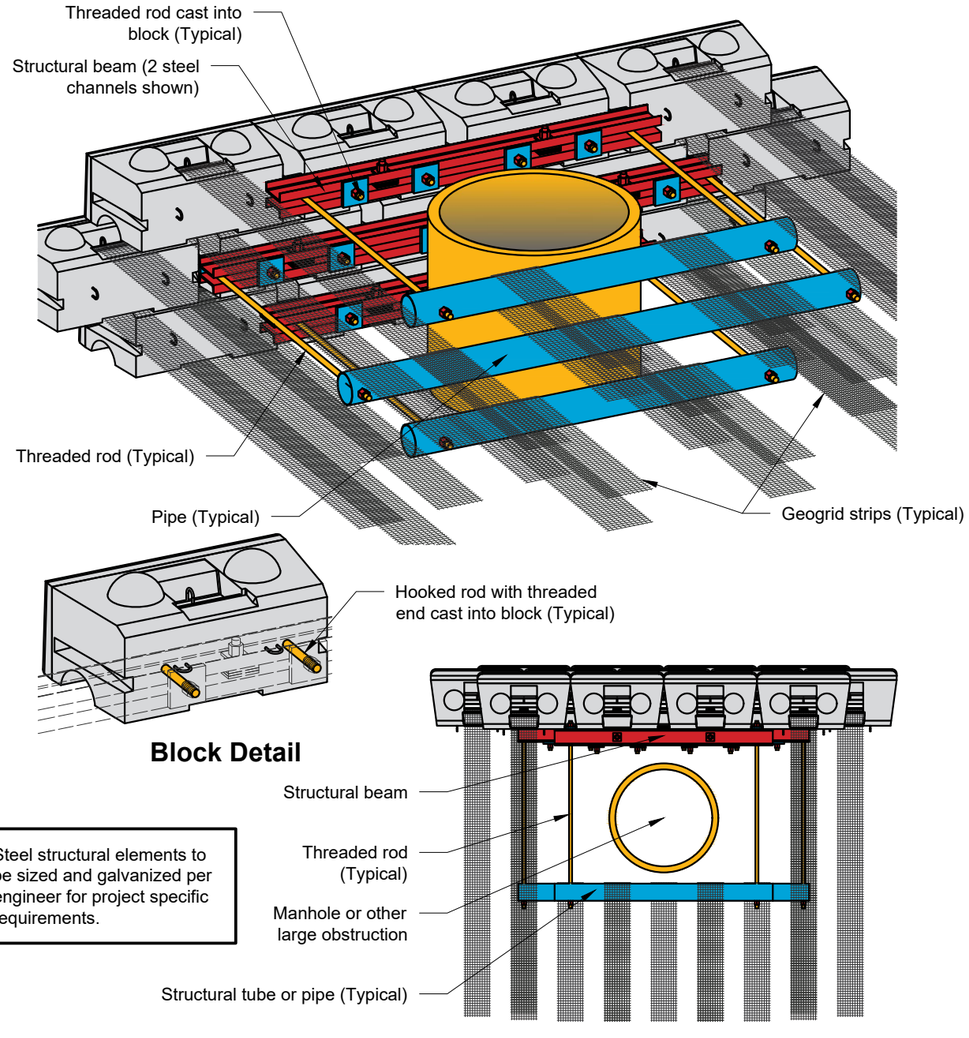
Light Pole Base or Concrete Pile in Reinforced Soil Zone



3D View from Back

Manhole or Large Obstruction in Reinforced Soil Zone



Top View

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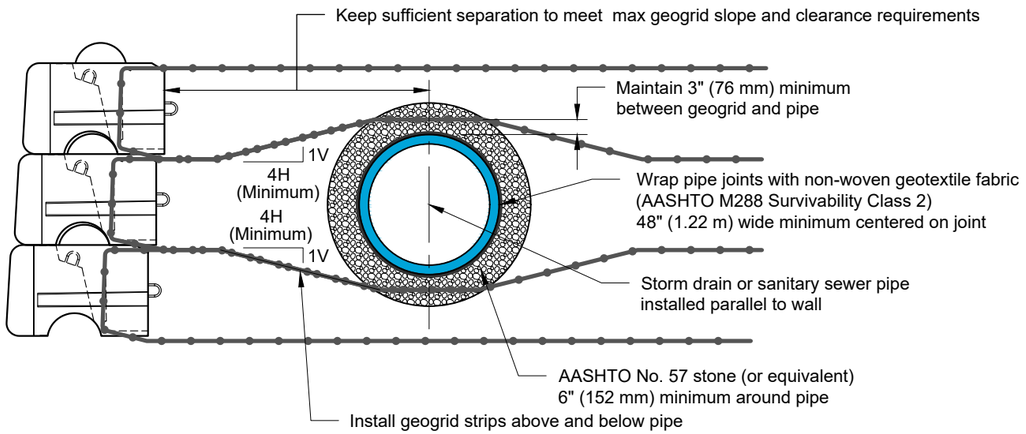
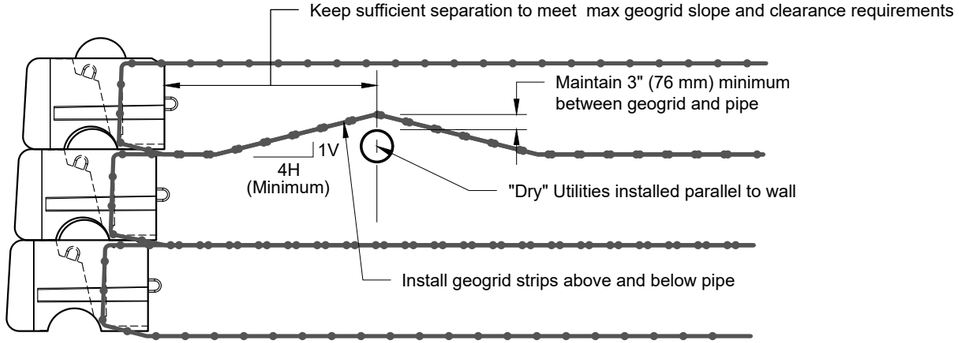
Utilities in the Reinforced Soil Zone



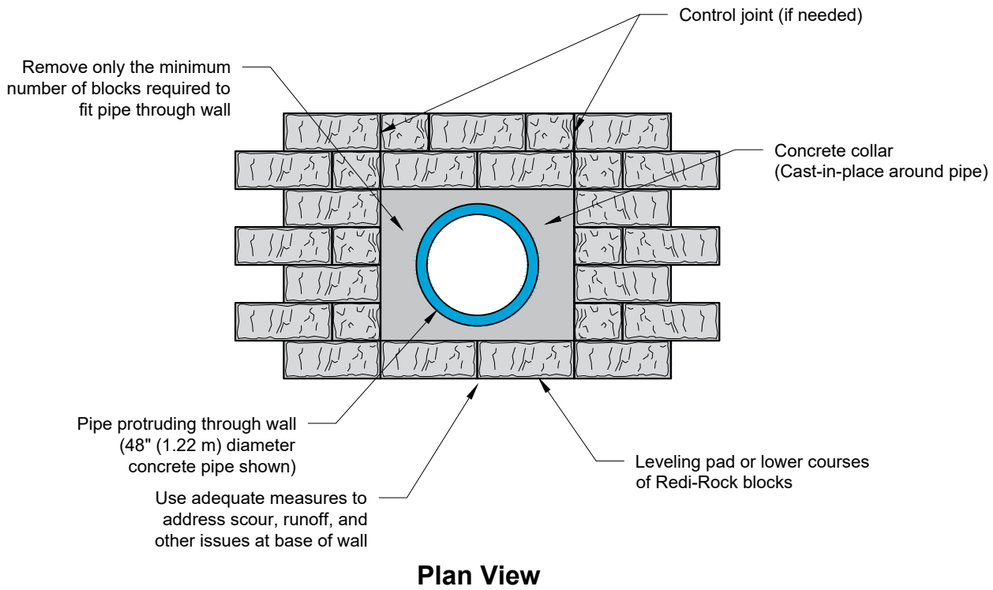
Storm or Sanitary Sewer Pipe



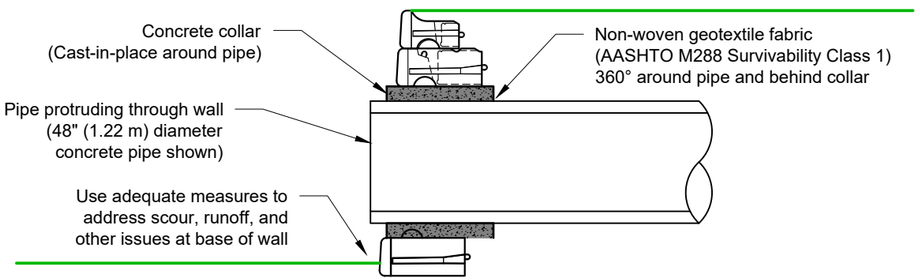
"Dry" Utilities (Electric, Gas, Telecommunications)

Redi-Rock International follows the recommendations of FHWA GEC 011 and discourages placing pipes or other horizontal obstructions behind the wall in the reinforced soil zone. Placing pipes in this zone could lead to maintenance problems and potential wall failure.

Pipes Installed Through Wall - Perpendicular

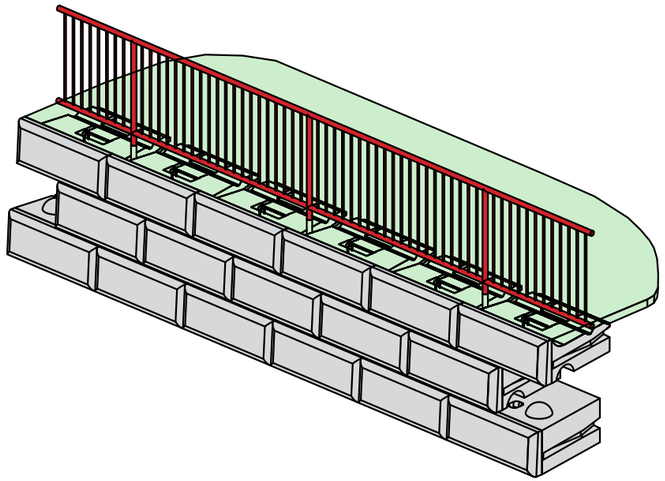


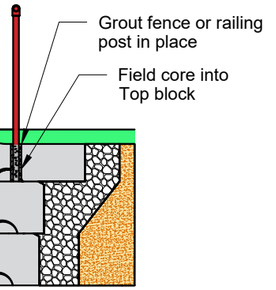
Plan View



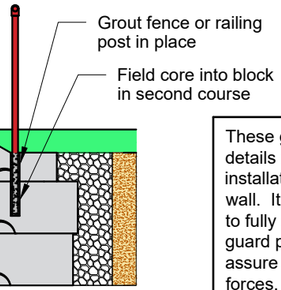
Section View

Common Fence or Pedestrian Guard Connections



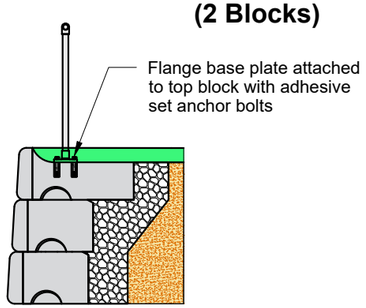


Grouted Connection (1 Block)

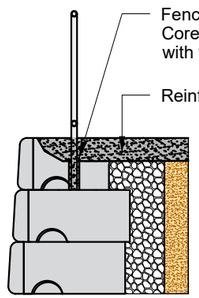


Grouted Connection (2 Blocks)

These generic pedestrian guard and fence details show a few potential options for their installation on the top of a Redi-Rock retaining wall. It is the design engineer's responsibility to fully design and detail the connection of the guard posts to the retaining wall blocks and assure acceptable resistance to the applied forces. Redi-Rock blocks are plain concrete, without steel reinforcement.



Flange Bolted Connection



Moment Slab Connection

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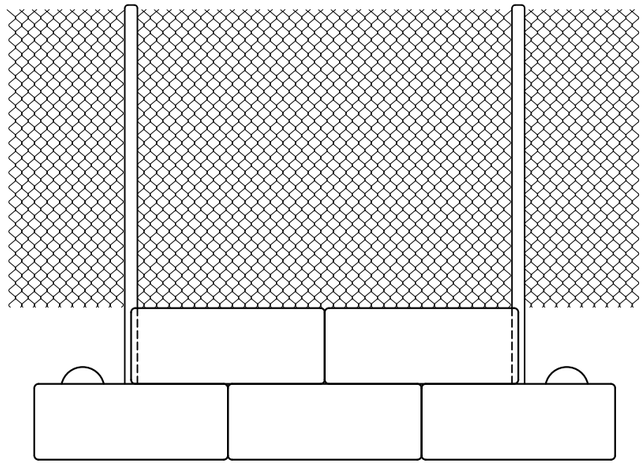
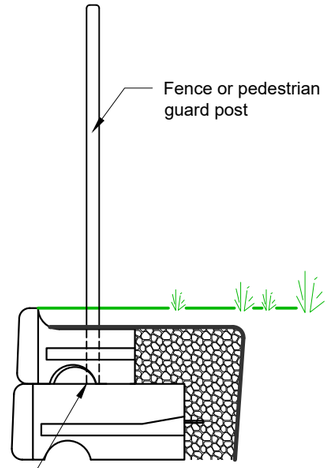
Common Fence or Pedestrian Guard Connection Locations

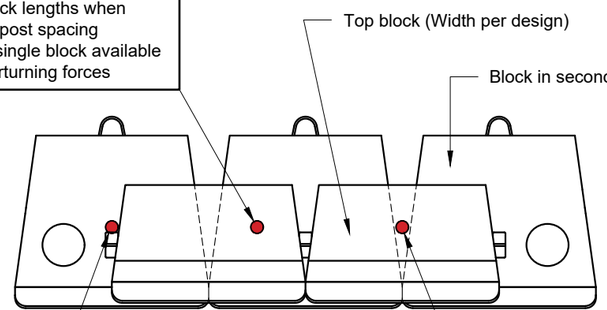


Front View



Side View

Connection Option #1
Anchor into the top block
- Consider block lengths when determining post spacing
- Weight of a single block available to resist overturning forces



Top View

Connection Option #2
Grout posts in v-shaped opening between top blocks
- Spacing in multiples of 46 1/8" (1172 mm)
- Weight of a 2 adjacent blocks available to resist overturning forces

Connection Option #3
Core through top block and grout posts in V-shaped opening between lower blocks
- Spacing in multiples of 46 1/8" (1172 mm)
- Weight of a 2 adjacent blocks on second level down and 3 top row blocks available to resist overturning forces

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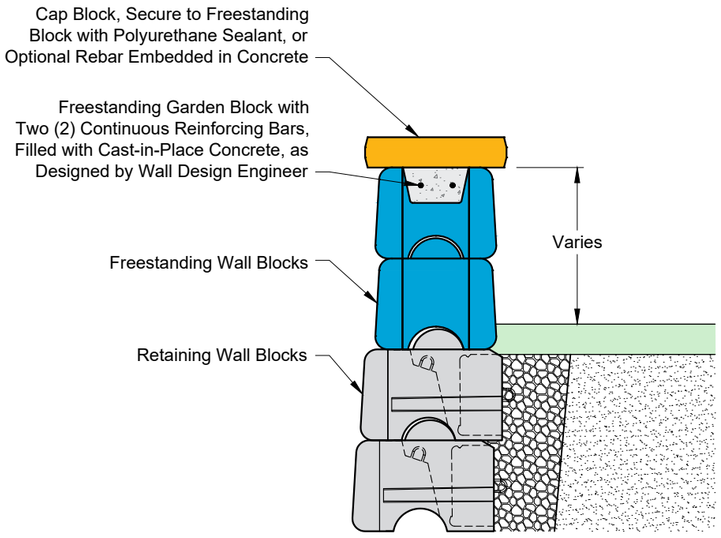
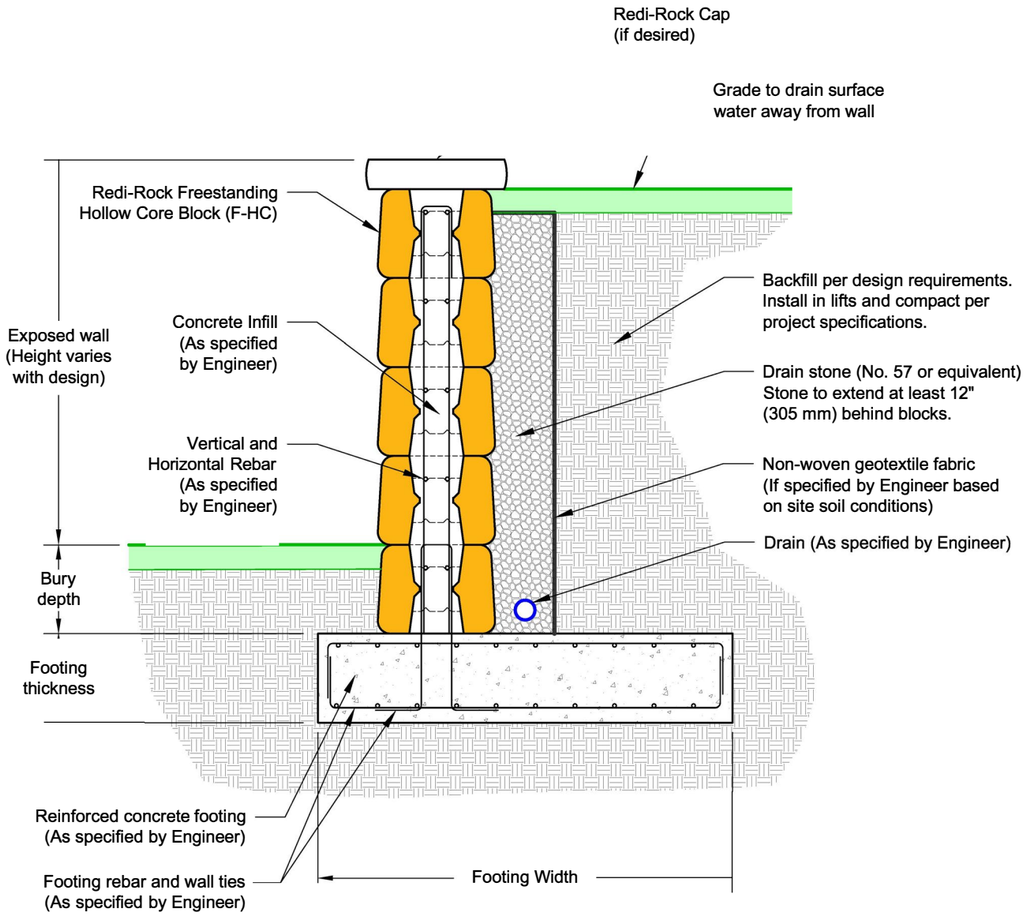
Freestanding Bond Beam at Top of Wall



Section View

Sealant Adhesive: One-component, highly flexible, non-priming, gun grade, high performance elastomeric polyurethane sealant shall have movement of plus or minus 25% per ASTM C719, tensile strength greater than 200 psi (1.4 MPa) per ASTM D412, and adhesion to peel on concrete greater than 20 PLI per ASTM C794. Apply sealant in one and one half-inch (1.5") (38 mm) diameter round "hersey kiss" shaped dollops located in two rows at the top of the Freestanding blocks at 8" (203 mm) on center.

Typical Cantilever Wall Section



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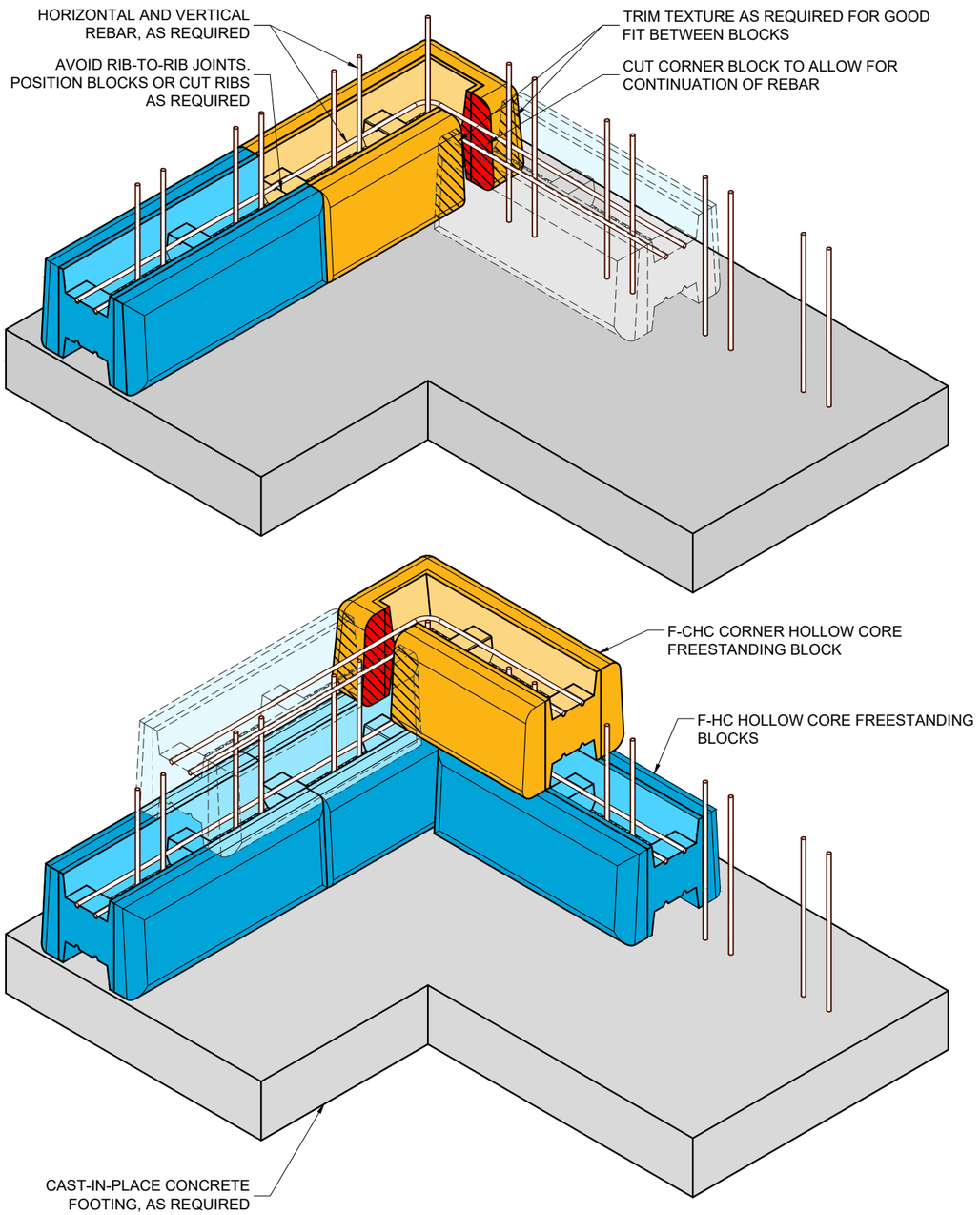
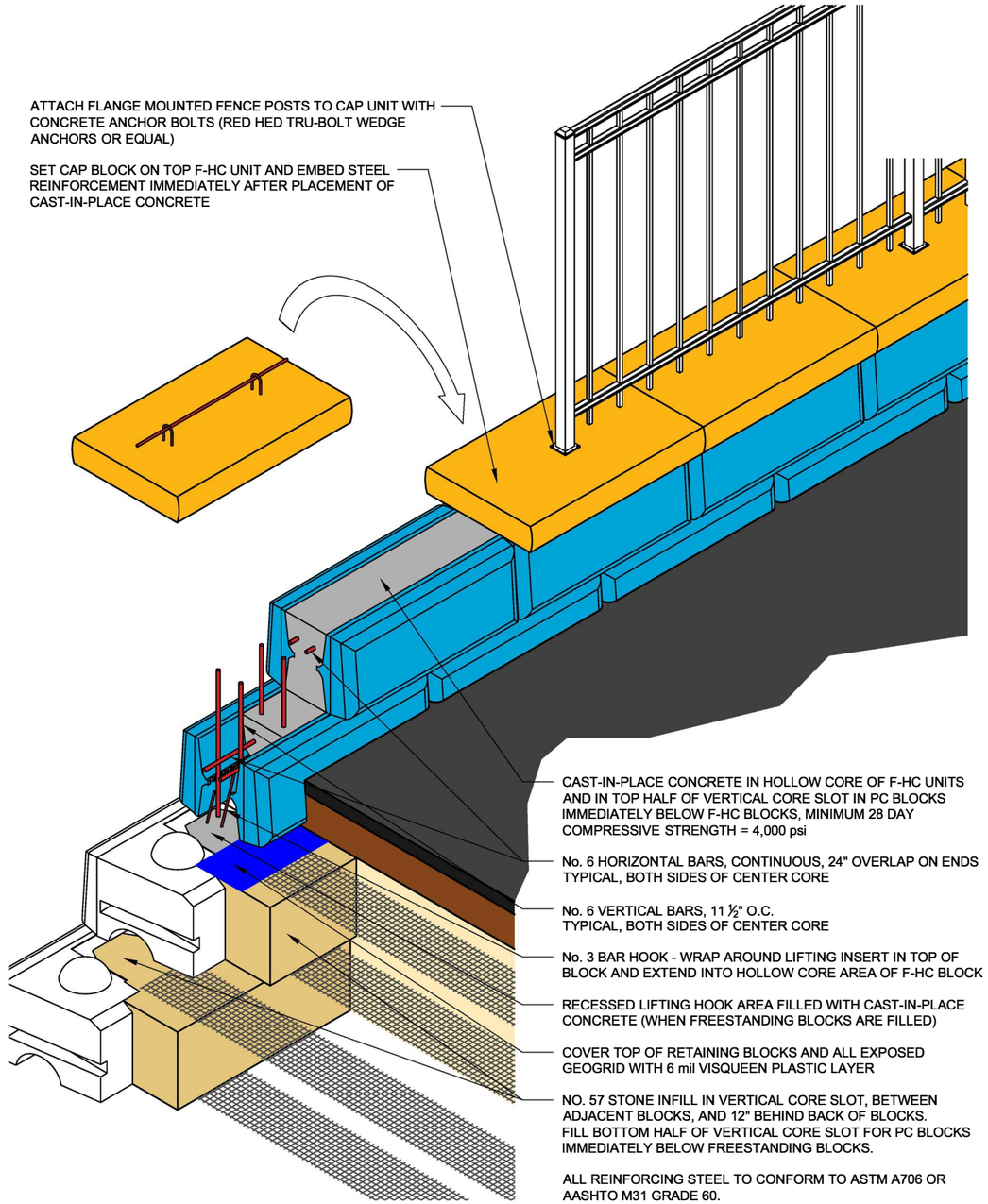
Freestanding Block Continuous Corner Detail



Freestanding Block Coping with Fence Attachment



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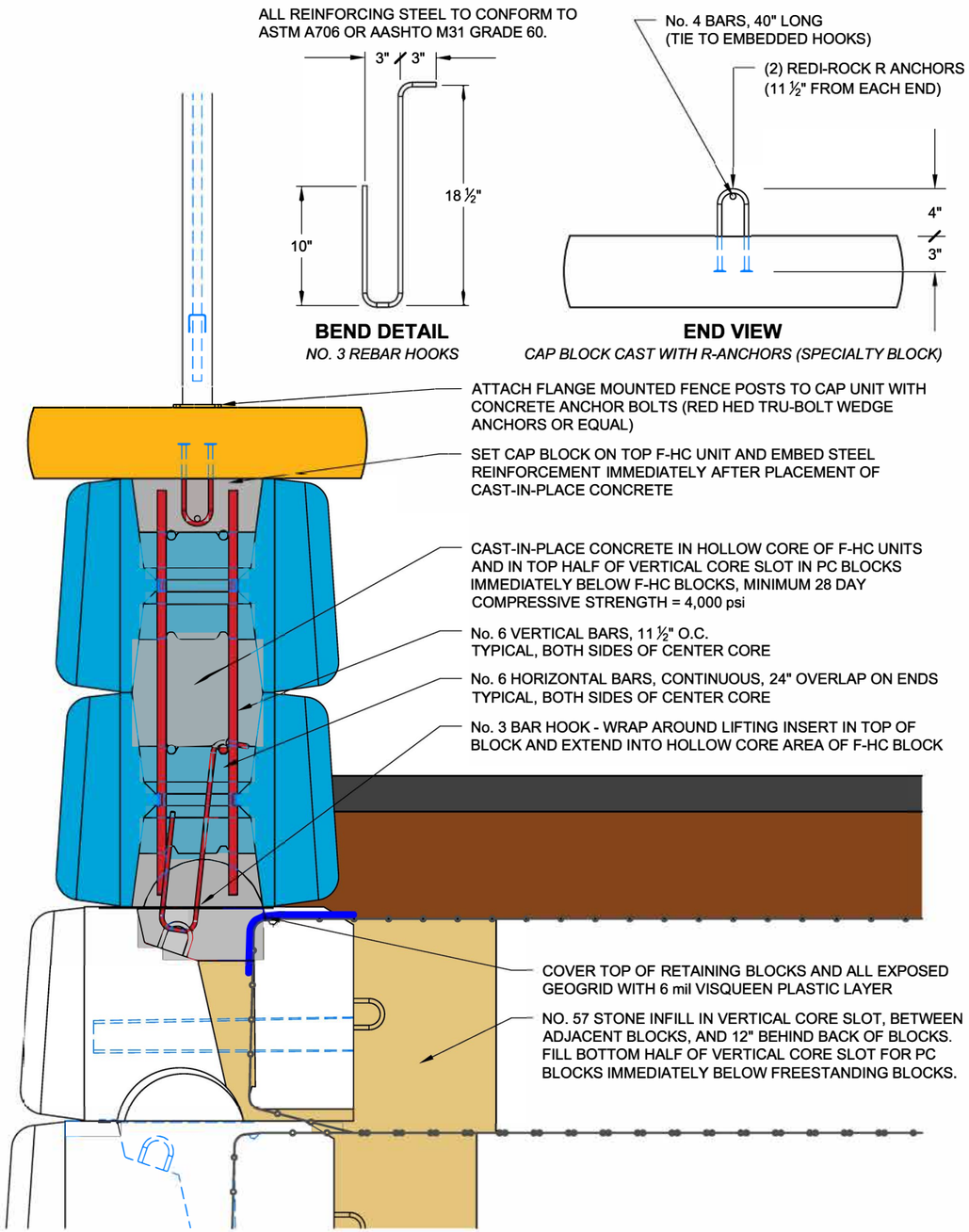
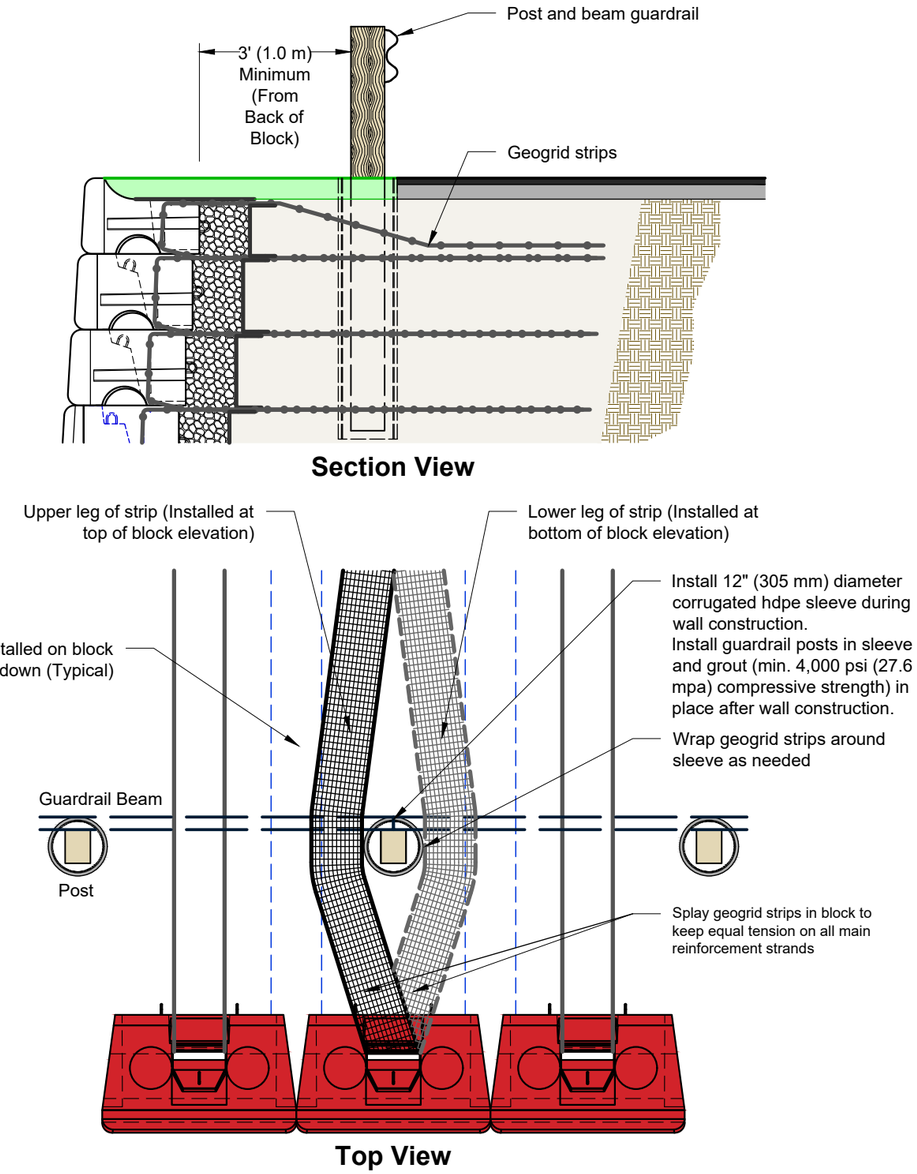
Freestanding Block Coping with Fence Attachment



Post and Beam Guardrail



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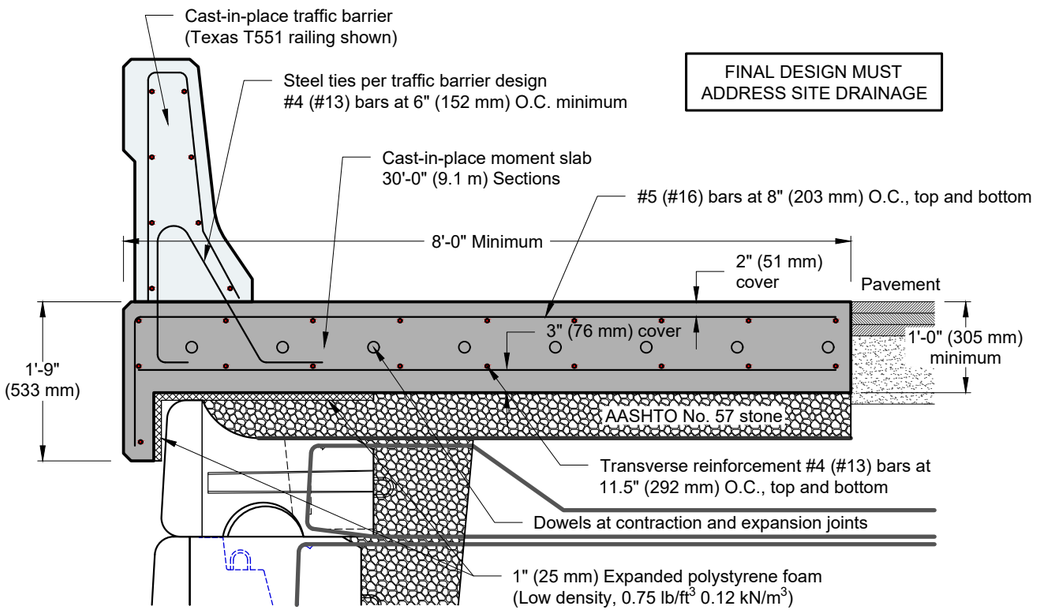
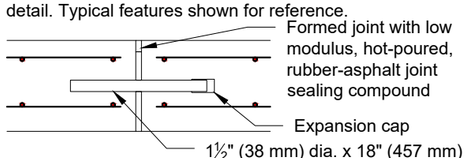
Cast-in-Place Moment Slab Traffic Barrier - Flat Grade Installation

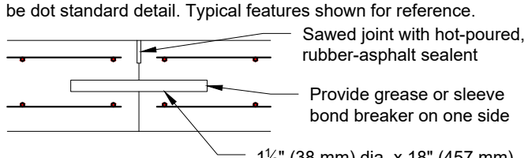


Expansion joints shall be provided in moment slab every 90'-0" (27.4 m). Expansion joint shall be dot standard detail. Typical features shown for reference.



EXPANSION JOINT

Contraction joints shall be provided in moment slab every 30'-0" (9.1 m) between expansion joints. Contraction joint shall be dot standard detail. Typical features shown for reference.



CONTRACTION JOINT

Materials

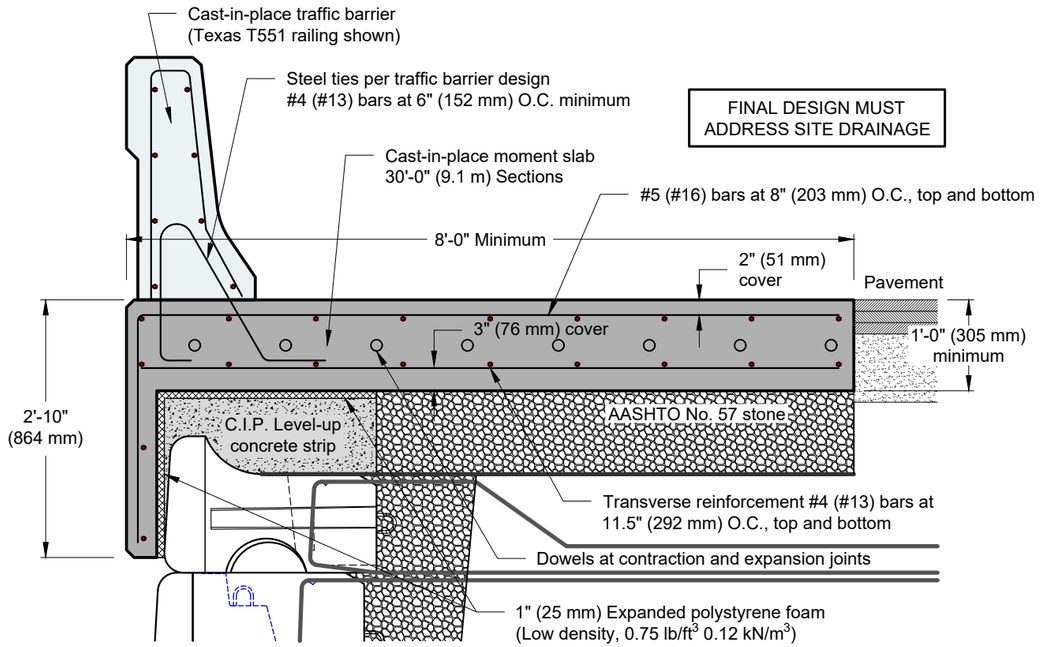
Concrete for cast-in-place barrier and moment slab shall be dot standard structure mix. Minimum 28 day compressive strength shall be 4,000 psi (27.6 mpa) or higher as specified. Reinforcing steel shall conform to ASTM A706 or AASHTO M31 Grade 60 (420 MPa).

Design

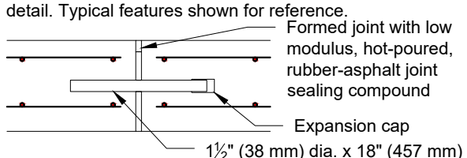
Moment slab shown is dimensioned based on an equivalent static load of 10,000 lbs (44.5 kN) per NCHRP Report 663. Moment slab reinforcement shown is based on *AASHTO LRFD Bridge Design Specifications, 5th edition, 2010*, **TL-4** loading detailed in Table A13.2.1.

The selection and use of this detail, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the registered professional engineer in charge of the project.

Cast-in-Place Moment Slab Traffic Barrier - Sloping Installation

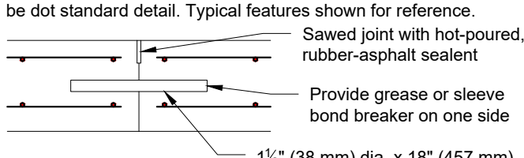


Expansion joints shall be provided in moment slab every 90'-0" (27.4 m). Expansion joint shall be dot standard detail. Typical features shown for reference.



EXPANSION JOINT

Contraction joints shall be provided in moment slab every 30'-0" (9.1 m) between expansion joints. Contraction joint shall be dot standard detail. Typical features shown for reference.



CONTRACTION JOINT

Materials

Concrete for cast-in-place barrier and moment slab shall be dot standard structure mix. Minimum 28 day compressive strength shall be 4,000 psi (27.6 mpa) or higher as specified. Cast-In-Place level up concrete shall be manufactured in accordance with ASTM C94. Minimum 28 day compressive strength shall be 3,500 psi (24.1 MPa) or higher as specified. Reinforcing steel shall conform to ASTM A706 or AASHTO M31 Grade 60 (420 MPa).

Design

Moment slab shown is dimensioned based on an equivalent static load of 10,000 lbs (44.5 kN) per NCHRP Report 663. Moment slab reinforcement shown is based on *AASHTO LRFD Bridge Design Specifications, 5th edition, 2010*, **TL-4** loading detailed in Table A13.2.1.

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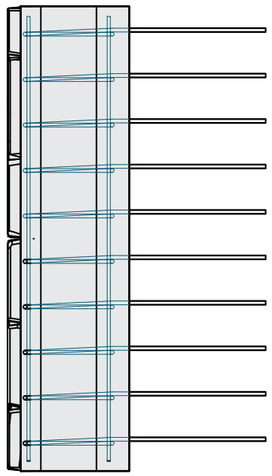
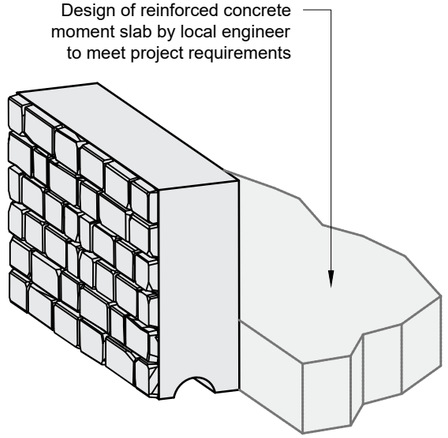
Precast Barrier Block

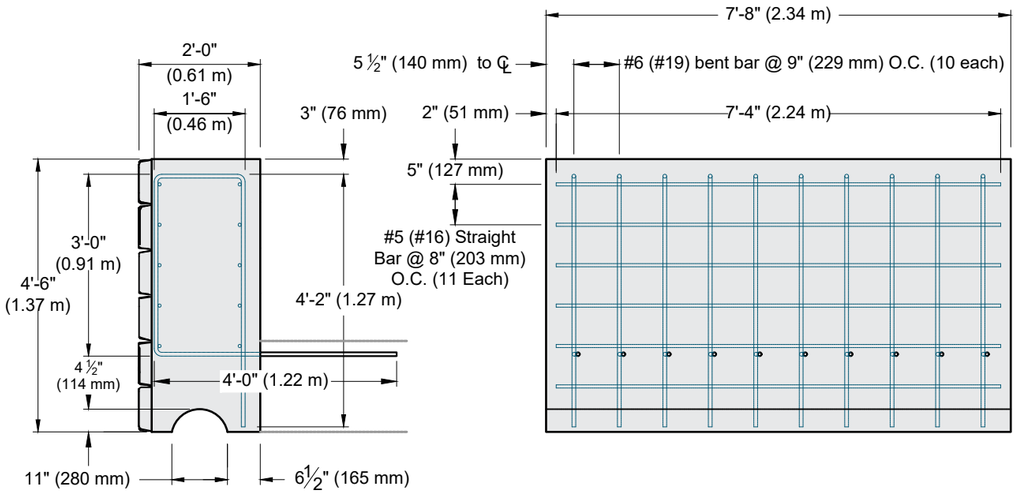




Isometric View

Rebar shown in barrier block meets AASHTO TL-3 loading requirements.
Rebar design in barrier block is intended to be modified as necessary to meet other loading conditions.
All reinforcing steel shall be grade 60 (414 MPa) deformed rebar. All concrete shall have a minimum 28 day compressive strength of 4000 psi (27.6 MPa).

Top View



Side View

Back View

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NOTES

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